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FIRST EDITION

PRACTICAL OBSERVATIONS
ON
INJURIES OF THE HEAD.

PRACTICAL OBSERVATIONS
ON
INJURIES OF THE HEAD.

BY
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“ ————— si non

Intendes animum studiis et rebus honestis
Invidiâ vel amore vigil torquebere.”

Hor : Epist : I. 2.

Ο βίος βραχύς, η δὲ τέχνη μακρὴ,
οὐδὲ χαιρὸς οἷός τις, ἡ δὲ πείρα σφαλὲς,
ἡ δὲ κρίσις χαλεπή.

Hippocrat : Aphor : I.

TO
WILLIAM HEY, Esq.

OF LEEDS;

THIS SMALL CONTRIBUTION
TO THE LITERATURE OF OUR PROFESSION
IS DEDICATED;

AS A TRIBUTE OF GRATITUDE
TO A MEDICAL PRECEPTOR;
AND OF AFFECTIONATE ESTEEM
TO A KIND FRIEND AND RELATIVE;

BY HIS FAITHFUL AND

OBLIGED SERVANT,

WILLIAM SHARP.

PREFACE.

THE object of the following pages is to give the result of my reading and observation on an important class of surgical cases, namely, Injuries of the Head.

With a view to invite the attention of practical Surgeons, it may not, perhaps, be improper to state, that the subject has had a large share of my attention during upwards of twenty years; and that the opportunities I have had of observing cases, have been very considerable.

In the present age, zeal and talent of every description are conspicuously engaged in the improvement of Medicine and Surgery; and I might well have excused myself from this labour, on the plea that many others are occupied in the same work; but a feeling like that expressed by Sydenham, in his beautiful preface, urged me to undertake it;—"How great soever others' endeavours have been, I always thought I lived in vain, unless I, being of the same employment, contributed something, how small soever, to the treasury of physic."

With regard to the subject itself, scarcely can a more important one engage the attention of the Surgeon. To be the instrument of prolonging life, under such untoward circumstances, is delightful indeed; and when not so favoured, to be able to minister somewhat to the patient resignation of the survivors, by the assurance that the best assistance of art has been afforded, is no small satisfaction.

“Durum ! sed levius fit patientiâ
Quidquid corrigere est nefas !”

Hor : Lib : I. Ode 24.

Bradford, Yorkshire,
August 3rd, 1841.

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PRACTICAL OBSERVATIONS

ON

INJURIES OF THE HEAD.

INTRODUCTION.

To undertake to describe the nature and treatment of Injuries of the Head, implies that the descriptions given by our best authors have been read, and that many opportunities of comparing them with new cases have occurred, and have been well observed.

Those who have attempted this will be best acquainted with its difficulties, and most able to appreciate any assistance which may be given them by others; and also most ready to excuse what may appear to be defective in any individual attempts.

The subject is as weighty as it is difficult. Whether we consider the importance of the

organ concerned, connected as it is with every vital function, and especially with sensation, volition, and intelligence; or the frequency of the accidents by which it is injured; or the danger which always accompanies such injuries; the investigation cannot fail to excite the most lively interest in the mind of the conscientious practitioner.

That this importance has been felt, is evident, from the pains which have been taken with the inquiry in all ages; and from the anxiety which has been shown by each succeeding writer, to suggest some improvement in the treatment of these formidable cases. Participating as I do in the general feeling, I am anxious to “contribute something to the treasury” of our knowledge on this subject; and my object in the following observations, is to give a brief survey of the manner in which the present opinions and practice of Surgeons have been arrived at; or in other words, how facts and observations have accumulated, and led to

gradual but important changes in practice ; and to show what ought to be considered the best rules to guide us in the present state of our knowledge.

When practical utility is the only object, a narrow limit may be put to historical researches ; I have, therefore, thought it sufficient to bring forward the opinions of the best surgical writers of the last three centuries, with very few allusions to the older authors. I have also borne in mind the value of my reader's time, and endeavoured to condense what I had to say into as small a compass as is consistent with its being intelligible.

For the sake of perspicuity, I have arranged the subject under the following heads ; premising that I do not contemplate at present making any remarks on injuries of the scalp.

Concussion of the Brain ;

Its Causes,

Its Nature,

Its Symptoms, and

The Treatment.

Compression of the Brain ;

From Extravasation,

From Fracture and Depression,

From Suppuration.

The Operation of Trepanning.

Laceration of the Membranes, and

Wounds of the Brain.

If I succeed in assisting any of my medical brethren in the more judicious and successful treatment of such alarming accidents, I shall be much gratified. I am not ambitious to put forth novel and surprising opinions ; believing, that “it is fortunate for mankind when new doctrines are not extravagant ; when those who enjoy the public favour have won it, not by the capricious and captivating effusions of genius, but by the lasting attraction of sober inquiry, and sterling sense.”*

* JOHN BELL.

CHAPTER I.

CONCUSSION OF THE BRAIN.

THAT cases of Concussion of the Brain demand the most grave consideration of the Surgeon, has been always admitted. “Concussion is a more dangerous injury than fracture, even though accompanied with deep depression of the skull: there is great danger in the case of concussion, though there be no fracture; there is little comparative danger in fracture when there is no concussion.”*

Whatever, therefore, tends to clear away difficulties on so serious a subject, and to make the ideas and the language of Surgeons more precise and intelligible, must be practically useful. In an inquiry into important injuries of the head, there seems great propriety in making

* BELL, Principles of Surgery, Vol. II. page 370.

this the first subject for investigation; and I hope what is most material respecting it, will be found clearly stated in the following Sections, on the Causes and Nature, the Symptoms, and the Treatment of Concussion.

SECTION I.

THE CAUSES AND NATURE OF CONCUSSION.

It is not necessary to make any lengthened remarks upon the *causes* of Concussion of the Brain; but it is particularly worthy of observation, that while Concussion is very frequently produced by violent blows on the head, or by falls by which the whole body is shaken, it is sometimes *caused by very slight degrees of violence*. As a striking proof of the truth of this remark, and also of the uniformity which exists in the operations and events in nature in all ages, I will give two cases; one from Hip-

pocrates, which occurred of course upwards of two thousand years ago; and one which fell under my own observation.

The first is as follows:—a young lady, aged twenty, was playing with another female, a friend of hers, who struck her with the open hand on the forehead; she felt giddy and soon after became feverish, and complained of headache; on the seventh day, a large quantity of matter was discharged from the right ear, which gave temporary relief; the fever, however, returned, she became comatose, lost her speech, the right side of the face was contracted, she breathed with difficulty, convulsions succeeded, and death took place on the ninth day.

The second case is this:—a boy, the son of a gentleman, my neighbour, about five years old, fell down a few steps, he was stunned for a short time, but soon seemed well, and no further notice was taken of it; several months after, he began to complain of head-ache, he became feverish, and notwithstanding the em-

ployment of very active depletive measures, squinting, dilated pupils, and excessively violent convulsions came on, the last fit of which continued three quarters of an hour, and ceased only with life. On examination, a “ramollissement” or softening of the central portions of the brain, was found to have taken place to a considerable extent.

This is one of several cases I have witnessed of apparently slight accidents being followed by very serious results; and they are well calculated to impress strongly upon the mind of the Surgeon, the necessity of attending, with the greatest vigilance and anxiety, all cases of injuries of the head.

With respect to the *nature* of Concussion, some degree of confusion still exists in the descriptions given us by our best writers; arising out of the neglecting to separate cases of concussion from all in which extravasation, or other visible lesion of the brain has occurred. Until the eighteenth century, the term concussion

which is constantly met with in surgical writings, means any damage done to the brain where there is no visible fracture of the cranium; thus including compression from extravasated blood, laceration of the brain, fracture at the base, &c.

PETIT* first attempted to mark the difference between concussion and compression without fracture; or to separate the cases in which there is no extravasation from those in which that has taken place. The mode of distinguishing them pointed out by PETIT, will be mentioned when considering the symptoms of concussion. In my opinion it is to be regretted, that surgical writers have not continued to observe the distinction; so that some still combine together the different kinds of cases, as much as they were mixed up with each other by

* PETIT was Surgeon to the Hôtel Dieu, and died in 1750. The Surgeons who have successively distinguished themselves at this Hospital, are SAVIARD, PARE, LA MOTTE, PETIT, DESAULT, and DUPUYTREN.

all before the days of PETIT. In illustration of this remark, I need only give a description of concussion very recently published; it is contained in "Observations on Injuries of the Head," in the Medical Gazette for June, 1839.

"*Concussion*.—Any vibratory shock, or jar, whether produced by direct violence to the head, or indirectly through any other part of the frame. These lesions are various, and give rise to numerous and very different effects. There may be loss of consciousness, volition, sensation and motion; disturbance of the organic system and functions; destruction of one or many functions without perceptible change of structure in the cerebral fibre; softening; disorganization; lesion; extravasation; effusion; inflammation of brain or its membranes; ulceration; partial gangrene; compression or weakened fibre by fluid within the vessels; permanent irritability or weakness of cerebral fibre." It appears to me very desirable, that such an assemblage of different cases should be separately

arranged, and that the term *concussion* or *commotion* of the brain should be restricted to cases of the first description, namely, an affection “of one or many functions, without perceptible change of structure in the cerebral fibre,” or other morbid appearance within the cranium; or in the words of BENJAMIN BELL,* “such a derangement of the brain as obstructs its natural and usual exertions; but which does not leave such marks of its existence behind it, as to render it capable of having its real nature ascertained by dissection.”† That such cases do occur has been frequently testified. MORGAGNI‡ says, “That some vessel is broken in concussion (compression) of the brain appears from very frequent observations; yet that this is perpetual in a fatal concussion, as if the ex-

* BENJAMIN BELL was Surgeon to the Royal Infirmary at Edinburgh, and published his “System of Surgery” in 1785.

† System of Surgery, Vol. III. page 132.

‡ JOHN BAPTIST MORGAGNI, born at Forli, in Italy, in 1682, and died in 1771. He was a pupil of *Valsalva*, and afterwards Professor of Anatomy at Padua.

travasated humours always were the cause of death, and the concussion of the brain never was of itself fatal, it does not seem possible for those to assert to whom the history I have quoted from LITTRE, and another of the celebrated HEVELIUS are known. For in neither of these was any thing found to be extravasated after a very violent blow upon the head. It is certain that neither of them was killed by an extravasation where there was none at all; death, therefore, was brought on by the concussion alone. Wherefore there is even room to doubt often when an extravasation is joined with it, whether the one or the other had the greater efficacy in producing the catastrophe.”* POTT† is equally clear ;—“ Very alarming

* Alexander’s Translation, Vol. III. pages 94, 95.

† PERCIVAL POTT was born in London in 1713, and died in 1788. He was a long time senior Surgeon of St. Bartholomew’s Hospital. The most celebrated English Surgeons of the eighteenth century, were successively pupils of each other. COWPER died in 1709, CHESELDEN in 1752, S. SHARP in 1765, POTT in 1788, and JOHN HUNTER in 1793.

symptoms, followed sometimes by the most fatal consequences, are found to attend great violences offered to the head, and upon the strictest examination both of the living and the dead, neither fissure, fracture, nor extravasation of any kind can be discovered. The same symptoms, and the same event are met with when the head has received no injury at all ab externo, but has only been violently shaken, nay when only the body or general frame has seemed to have sustained the whole violence.”* A case confirming this last remark I recently attended, in which the most alarming symptoms followed a fall, though the head was in no visible way injured, and for two days the patient made no complaint.

Lest it should be thought that the improved state of pathological anatomy would now enable us to discover morbid changes, which were not observed by POTT or MORGAGNI, I need only remind my readers, that the most recent authors

* Pott's Works, Vol. III. page 254.

admit, that “in many fatal cases, *no change* in the state either of the vessels or of the cerebral substance, is perceptible on minute examination.”*

Again, “It has been long since established by the investigations of surgeons, that another cause besides those which are rendered manifest by dissection, may be concerned in producing the symptoms which immediately follow a concussion of the head. A man receives a blow on the head; he becomes insensible, and continues so for a few minutes, or for several hours. He dies in consequence of this or of some other injury; and on examination after death, the brain and its coverings appear to be perfect in all their parts; so that *the most accurate anatomist can discover nothing* different from the natural appearances of these organs. Opportunities of verifying this observation occur more or less to all those who have had much experience in their profession. In such cases the patient is

* LISTON.—Elements of Surgery, Part II.

said to have been stunned, or to have suffered from concussion of the brain; and it is to one of these three causes, namely, concussion, compression, and wounds of the brain, that the symptoms which immediately follow an injury of the head, and which are antecedent to those produced by inflammation are to be referred.*

I think I have now established the fact, that there is a class of injuries of the head, occasioned by blows or falls, sometimes severe, sometimes trivial, which not unfrequently terminate fatally, without there being any lesion or altered appearance within the head, which can be detected by the anatomist; and I hope I have also rendered evident the propriety of limiting to these cases the term “Concussion of the Brain.”

It seems, indeed, reasonable to suppose, that some organic change has taken place when the brain has been so much shaken as to give rise

* SIR BENJAMIN BRODIE.—*Medico-Chirurgical Transactions*, Vol. XIV.

to the symptoms which we meet with, and which will be described in the next section; but seeing that the *minute structure* of the brain is itself withdrawn from the observation of our senses, it is not likely that we can always detect the morbid change.

Sometimes, however, a laceration of the vessels of the pia mater, producing an ecchymosed appearance is observed; sometimes merely an increased vascularity of the membrane; and sometimes a laceration of the substance of the brain, or spots of ecchymosis in various parts of the brain; which as they cannot properly be considered cases of *compression* of the brain; nor are they purely cases of concussion, may perhaps be with most propriety looked upon as the connecting links between the two descriptions of injury.

It is especially necessary to remember, that concussion is often followed by inflammation. The original shock may not have ruptured any vessel, nor have produced any visible lesion,

but it may have so affected the brain, that inflammation, and subsequently suppuration, and death from either cause, are the consequence. These cases must therefore be considered in the following sections, because the surgeon is deeply interested in them; but I need not attempt to describe the nature and appearances of inflammation, which have been so elaborately treated of in the writings of physicians.

SECTION II.

THE SYMPTOMS OF CONCUSSION.

ON this difficult subject I shall endeavour to make myself as intelligible as I can, and for this purpose I will arrange all the different cases of concussion into three classes, requesting at the same time my reader's careful attention.

The first class:—those cases in which alarming symptoms arise immediately on the injury

being received, which either soon terminate in death, or speedily pass off altogether.

The second class:—cases of concussion in which a few days will elapse after the accident, and then violent and dangerous symptoms suddenly come on.

The third class:—cases in which after an accident has occurred, only slight complaints are made for a long time, and which are generally disregarded, until it is discovered that inflammation has been going on and is probably ending in a fatal effusion of serum, in softening of the brain, or in suppuration.

I will then consider the question, what are the symptoms which distinguish concussion from compression of the brain?

In the first class of cases of concussion alarming symptoms, as loss of sense, motion, and speech, vomiting, and more or less of a deathly coldness, occur *immediately* after the fall or blow; in the most formidable cases these

symptoms soon end in death, in others less severe they will disappear in a few hours, or in a day or two, and no further complaints arise. I will give two cases in illustration.

1840, January. Master ———, aged six, was playing on a frozen pond, and fell upon his forehead; the blow, as is usual in such falls, was a smart one; he was stunned, bewildered, and speechless; after being carried home, and laid upon a sofa, he rolled off, and attempted to creep under the fire place; he vomited once or twice, and remained in this idiotic state for about half an hour; his senses then returned, and when I saw him shortly after, he had perfectly recovered; at least all that remained, was a slight bruise on the forehead;—he had no further ailment.

1839, November 22, Friday. David Ormond, a boy about eight years old, was struck on the head, while at the bottom of the shaft of a coal pit, by a falling coal. I was called to him

in the evening. A round soft tumor had arisen over the upper part of the occiput, producing those deceptive appearances which are so easily mistaken for fracture with depression. He had vomited twice; his pulse was 60, very irregular and feeble; he was pale, sick, and exhausted. A little warm tea was given, warmth applied to the feet, and a poultice to the head.

23rd. Saturday. He still looked alarmingly ill; pulse 58; with occasional delirium; but the swelling was dispersing. The poultice continued. The bowels had been moved by a saline aperient.

24th. Sunday. He complained of head-ache, and the pulse had risen. Seven leeches were applied to the head, and the bowels more freely opened. The swelling was gone. A cold lotion applied freely to the head.

25th. Monday. Very much relieved.

26th. Tuesday. Continues better.

27th. Wednesday. Quite free from complaint, except weakness.

30th. Well.

The second class :—From what has been stated in the preceding section, I have shown that in cases of concussion of the brain, *no morbid appearances* are discoverable after death ; it is also a fact of equal importance, though it has not yet been pointed out as it deserves, that in many cases *no symptoms* appear for some time after the injury has been received, but that after that interval, they come on with much violence. The following case may serve as an example of a class of accidents of not unfrequent occurrence.

1839, August 13th. Tuesday. Mr. ———, a very stout person, was going to ——— in a gig. The horse took fright and ran away ; the reins broke ; and Mr. ——— threw himself out of the gig behind ; he fell upon his left arm, and left side and hip, which were bruised ; his head had not touched the ground, nor had it been struck, or knocked against any thing. On

my seeing him shortly after the accident, he complained very little, and not at all of his head ; and having ordered another carriage and horse, he proceeded to ———, where he dined heartily. He afterwards got bled to nearly two pounds, and until he fainted. He returned home in the evening, (a distance of eight miles,) appearing scarcely at all indisposed.

14th. Wednesday. No complaint beyond a little stiffness. Attended his counting-house nearly as usual, notwithstanding my strong remonstrance.

15th. Thursday. This morning he complained of violent pain and throbbing in the head, for the first time. He was bled again to a pound and a half; purged; and cold lotions applied to the head; he remained in bed, and took no solid food.

16th. Friday. Pain in the head continued; with fits of dizziness and of suffocating flatulence;—again bled to a pound and a half, and sixteen leeches applied to the temples, and

calomel and digitalis given. Relieved by the bleeding.

17th. Saturday. Better;—the pulse hitherto has not exceeded 100, generally it has been 92.

In the evening the pain had returned, with twitching of the right arm, and rolling of the head;—bled to eight ounces, and again relieved. Small doses of compound tincture of camphor, and tincture of colchicum, were given during the night.

18th. Sunday. Very uneasy; could not bear the light; flatulent; but no pain in the head. Medicines continued.

19th. Monday. Better.

20th. Tuesday. Called up to him at three, a. m. found him giddy, and almost suffocated with flatulence. Gave him draughts with spiritus ammoniæ aromaticus, and infusion of cascarilla during the day, and applied croton oil to the nape of the neck; and in the evening he appeared to be much better.

From this time he gradually recovered, having passed through a period of very considerable danger. In a few months he became as stout as before the accident, and has since continued in good health.

It is my belief that this gentleman's life would have been lost, had a less prompt and vigorous plan of treatment been adopted; and that it would have resembled many in that melancholy, but most instructive series of cases which occurred to VALSALVA and MORGAGNI, and which are faithfully recorded by the latter.* In this catalogue many cases are given in which no symptoms appeared till the 6th, 11th, 12th, and 14th day after the accident. These cases are so interesting and important, that I intend to give a detailed analysis of them in an appendix.

The fact that no symptoms occur for several days after the accident, in many cases in which

* MORGAGNI. De causis et sedibus morborum, Lib: LI. et LII.

the brain has been seriously injured, though I fear frequently neglected, ought always to be borne in mind. Life may be lost by disregarding such accidents on their first occurrence; or, on the other hand, injuries which are sufficient to prove fatal, may, by careful attention, be effectually remedied.

The third class of cases of concussion of the brain comprises those accidents in which, no visible injury of consequence being produced, nor any symptoms appearing for a long time, the patient is supposed to have escaped unhurt, and for weeks no further attention is given to him,—or, perhaps, some other part of the body was hurt at the same time, and that is attended to, but the head neglected; at length, however, it is discovered that inflammation, and other serious mischief have been going on in the brain, and the patient dies of effusion, of softening, or of suppuration.

After any injury of the head, there must necessarily arise some excitement; the action of

the heart is increased ; the blood is circulated more rapidly ; it is sent in greater quantity to the head ; producing increased heat, throbbing of the arteries, pain, and generally external swelling, in proportion to the nature and extent of the injury. These are the preliminaries of inflammation ; they may subside, or they may be checked by judicious treatment ; but should they continue, and the necessary remedies be omitted, inflammation of some part of the head commences ; it may be external to the bone ; in that case abscess in the cellular tissue, under the muscular aponeurosis, or under the pericranium itself may be expected ; or it may be within the cranium, constituting inflammation either of the membranes, or of the brain itself, or of both.

With regard to the symptoms of inflammation of the brain, as these are fully discussed in the writings of physicians, I need not do more than make a few observations.

The first is, that if a patient, after an accident, complain of head-ache, throbbing in the head, giddiness, sickness, or any other symptom which may indicate an affection of the head, the most solicitous attention ought to be given to it by the medical attendant, and every proper measure adopted, to prevent or to remedy all inflammatory action.

The second observation is, that in inflammation of the membranes, particularly of the tunica arachnoides, the *pulse* is met with in two very opposite states; in the one it is very frequent, small, and wiry, as in inflammation of a serous membrane in the abdomen; in the other it is remarkably slow, irregular, and depressed.

The third observation is that much more *delirium*, and particularly delirium of the violent kind, attends inflammation of the membranes, than of the substance of the brain; and I may suggest, in passing, that this fact seems to confirm the physiological opinion that the *grey*

matter of the brain is more important than the fibrous or white, and more immediately connected with the operations of the mind, and being in immediate contact with the membranes, is more violently affected by their inflammation.

My fourth and last observation on this subject is, that when *convulsions* succeed the first stage of inflammation, the case, so far as I at present recollect, is always fatal, whether more blood be abstracted or not. These convulsions, to a careful observer, differ in appearance from those which arise from loss of blood or other cause of exhaustion. It is difficult to convey an idea of the difference in words, but I may mention one circumstance, the *eyes* are affected *first*, and more violently in the fit following inflammation, than when the cause is exhaustion.

Some of the cases related by MORGAGNI, are examples of this class of cases of concussion; from their unexpectedly fatal termination

they are cases of a very painful description ; as a further illustration, I feel inclined to give a short account of the manner in which I had the misfortune to lose a brother, a highly talented young man of seventeen, sincerely hoping that the lesson may prove of some service to others.

1814, April 19th. Mr. John Sharp was riding, and by some means his horse got from a trot to a gallop, and having lost his command, to avoid passing through the toll-gate at that speed, he quitted his horse, and by the fall bruised his knee a little, and also his head ; neither of which bruises caused the least alarm, as the skin was but just broken. In the course of four or five days, some inflammation of one eye took place, but this was considered only the effect of cold ;—but on the *eighth* day from the fall, a violent head-ache came on, and on the tenth he was cupped, which removed the pain for a few days ; it then returned, and a blister was applied between the shoulders ; this

again gave relief for a time, but the pain returned and the fever continued. A physician was called in, who considered the accident of the fall from the horse of no consequence whatever, but attributed the complaint to the bad state of the constitution, as in his opinion no symptoms from the effects of the fall appeared; (though he had been previously a remarkably strong and healthy youth;) a bracing, tonic plan was adopted, accompanied with good living; bark, jellies, &c. In about a fortnight he was pronounced out of danger, although the head-ache continued; and on the 14th of June, he was sent into the country for change of air; although the pain in the head was getting worse. He became much worse immediately after the journey. On the 23rd he took to his bed. On the 24th a stupor came upon him, which deprived him of sense. On the 25th, his head was shaved, and a large blister applied, which discharged copiously, and in some degree diminished the stupor, but it was very far indeed

from being removed ; he continued insensible and helpless, and died on the 1st of July.

It will be perceived that, in this case, the real nature of the complaint was unhappily not understood by the medical attendants ; and consequently an improper and unsuccessful treatment adopted. The description is copied from letters in my possession, but the case did not come under my own observation.

I must now take up a question of great difficulty, namely, what are the symptoms which distinguish concussion from compression of the brain ? In the present state of our knowledge, I cannot answer this question as I could wish ; but in endeavouring to do so, I shall be enabled to explain further the kind of symptoms usually attendant on concussion.

I have stated, that previous to the time of PETIT, concussion was indeed distinguished from fractures of the skull, but not from any other injuries of the head ; so that it would be

in vain to seek for the symptoms which distinguish it from compression, in the descriptions given us by writers preceding him. The observation made by PETIT was this ;—When drowsiness and loss of sense occur on the moment of the accident, the case is probably one of concussion ; but when they come on some time after, they are produced by extravasation, and the case is one of compression. Thus far PETIT, and could this distinction be observed always, it would be highly satisfactory ; but unfortunately this does not happen. The symptoms which immediately follow a blow or fall, and shortly after disappear, may be attributed to a concussion of the brain ; and if a short interval of sense occur after the accident, and before the symptoms appear, they are, in all probability, produced by the rupture of a vessel or vessels, and the escape of blood which produces compression ; and further, when stupor, vomiting, or other symptoms come on immediately after a blow, and in a short time

pass away; and after another short interval return, it is with great propriety that the first symptoms are referred to concussion, and the second to compression. But exceptions to these observations are often met with; in some cases of concussion the symptoms do not come on for some time after the injury has been received; in some cases of compression, the effusion of blood is so considerable, that the symptoms are immediate; and in a third set of cases in which concussion and rupture are combined, the symptoms caused by the latter come on before those produced by the former have had time to subside, when the effects of both being so similar, and so blended together, it is clearly impossible to distinguish the causes with any certainty.

This first separation of the two kinds of cases was beneficial; but the progress which has been made in perfecting the distinction, during the hundred years which have since elapsed, has not been so great as might have been hoped for

and expected. LE DRAN supported the observations of PETIT; they were repeated with a qualification similar to the one I have given by POTT; and they have ever since been admitted by surgical writers.

The next addition given to us was by BENJAMIN BELL, in the following passage;—"So far as my observation goes, the most material difference which occurs between the symptoms produced by these two causes, concussion and compression of the brain, is met with in the *breathing* and in the *pulse*. In a compressed state of the brain, the breathing is commonly deep and oppressed, similar to what most frequently takes place in apoplexy; whereas in patients labouring under commotion or concussion, the breathing is in general free and easy, and the patient lies as if he were in a sound and natural sleep. The pulse is commonly soft and equal, and not irregular and slow, as it is usually found to be when the brain is compressed. In cases of compressed brain,

although little or perhaps no relief may be obtained from blood-letting, yet no harm is observed to occur from it; for in such circumstances it may be prescribed in moderate quantities without reducing either the frequency or strength of the pulse; whereas in real concussion of the brain the pulse will frequently sink, and become much more feeble on the discharge of only eight or ten ounces of blood.”* This last observation is of importance, not merely as a diagnostic mark, but also as often indicating clearly the proper method of treatment.

Other marks of distinction are met with in later surgical works, but unhappily some of them are contradictory; instead, therefore, of describing them in detail, I shall now give the following series of characteristic symptoms as the best which can be presented in the present state of our knowledge.

* B. BELL'S Surgery, Vol. III. p. 137, 138, 5th Ed. 1791.

In concussion the *symptoms* usually make their appearance immediately after the accident, though it not unfrequently happens that a considerable interval passes over before they come on; in compression there is generally a short interval between the accident and the symptoms.

In concussion, the symptoms if not so overpowering as soon to terminate in death, either pass away, the first signs of depression being followed by corresponding excitement, and this by complete recovery; or we may have the three stages pointed out by Mr. ABERNETHY, first of insensibility, second of restored animation, and third of inflammatory action. In compression, the symptoms if not relieved by active depletion, and other means, become aggravated, and death ensues either very soon, or after inflammation and frequently also suppuration have supervened.

In concussion, the *pulse* is generally not so

slow, labouring, and intermittent as in compression.

In concussion, *bleeding* sinks the pulse and the patient; in compression the pulse rises and relief is afforded.

In concussion, there is commonly more *insensibility*, followed by *delirium*, than in compression.

In concussion, perhaps *vomiting* is more frequent than in compression, though it often occurs in the latter.

In concussion, there is less frequently *coma*, *convulsions*, and *paralysis*, than in compression.

The state of the *pupil* is an uncertain sign; it is often dilated and insensible to light, and often contracted in both concussion and compression.

I am aware that exceptions to each of these remarks will be met with; they can only be considered as approximations to the truth; but they are the result of my own observations.

and most of them are confirmed by eminent surgical authorities.

Before closing this section, it will be proper to mention a few other symptoms which are occasionally met with ; for example, sometimes at the moment of the accident, the patient has a sensation of flashes of light before his eyes, or of noise in his ears, and is as if intoxicated ; sometimes the first symptoms are followed by furious and raving delirium, which, however, soon subsides ; and sometimes individual senses remain affected for a very long time after the injury, as the sight, smell, taste, or hearing : interesting cases of which are given by SIR BENJAMIN BRODIE, in the *Medico-Chirurgical Transactions*. Vol. XIV.

A careful consideration of these remarks will, I think, generally enable the attentive surgeon to make up his mind, in any particular instance, as to whether it be a case of concussion or not. The subject, however, admits of still further

investigation and improvement. It is well to point out to the student of any branch of science what is still defective, as well as what is already ascertained; and though much has been done since the days of POTT, there is yet truth in the remark made by him, that “every thing relative to this kind of disorder is fallible and uncertain,”* a remark repeated in later days by another eminent writer on surgery;—“Such is the uncertainty in these injuries of the head, that they should be the chief occupation of the surgeon!”† So true is the aphorism of SENECA, written eighteen centuries ago;—

“Multum explorare restat;
Multumque, per sæcula multa,
Restabit!”

* Works, Vol. III. page 239.

† BELL, Principles of Surgery, Vol. III. page 385.

SECTION III.

THE TREATMENT OF CONCUSSION.

HAVING in the preceding section considered the different cases of concussion as forming three distinct classes, it will be proper in attempting to describe the appropriate treatment, to consider each of these classes separately. Indeed, it is with a view to the treatment, that it is practically useful to make the separation.

The first class of cases are those in which there are immediate and violent symptoms. It was formerly common to trepan such cases, but this practice has happily been laid aside, it could never do good, and it must frequently have done very serious harm. Hence the necessity for using every effort to distinguish cases of concussion from other injuries of the head. In these cases there is no depressed bone to elevate; no extravasated blood to evacuate;

no tension to relieve ; nor can inflammation be prevented by adding to the shock which has produced the concussion, the further injury of removing a portion of the cranium, and exposing the membranes of the brain.

No local treatment, beyond cutting off the hair, and perhaps shaving the head, for the purpose of examination, and for the application of evaporating lotions, or leeches, can possibly be useful. When, therefore, the surgeon has carefully satisfied himself that the case is most probably one of concussion, he will aim at being of service to his patient chiefly by general treatment.

On this subject it is also necessary to remark, that up to a late period, it was the practice to give cordials, and stimulants in the first stages of concussion. This treatment, however, has now been generally abandoned, except perhaps in a few extreme cases, where life seems to be on the point of departing, when a cordial may be the unicum remedium of the moment.

“Cases of this last description,” says SIR BENJAMIN BRODIE, “are, however, in reality of rare occurrence; and there are, indeed, sufficient reasons why we should regard that condition of the system which approaches to syncope, as being in the great majority of instances in which it exists, conducive to the patient’s welfare, and why we should wish to prolong, rather than to abridge, the period of its duration; the same blow which gives rise to symptoms of concussion, frequently occasions the rupture of some small vessels within the cranium. The same state of the system which produces an enfeebled action of the heart, is calculated to prevent the ruptured vessels from pouring out their contents; and the longer it continues, the less is the danger of internal hæmorrhage. If we artificially excite the action of the heart, by the exhibition of wine and ammonia, we are in danger of inducing symptoms of pressure on the brain. If on the contrary we watch the gradual restoration of the pulse, and at the

proper moment take from the arm a sufficient quantity of blood, to prevent the heart resuming its wonted action, it is probable that we may often succeed in checking or arresting an extravasation of blood on the surface of the brain, or among its membranes, which might otherwise prove fatal. There is also the following very important circumstance which is not to be overlooked in this part of the inquiry. A state of depression is followed by a state of excitement; as the patient recovers from the former, the pulse with respect to fulness and strength, becomes raised above the natural standard, and it is evident that this affords an additional argument in favour of the practice which is here recommended.”*

The truth and value of the preceding observations must be pleaded in apology for the length of the quotation. They are, I trust, sufficient to decide the kind of treatment which this class of cases of concussion require, in the

* *Medico Chirurgical Transactions*, Vol. XIV. page 377.

first instance. Our plan, therefore, should be, rest and quietness, and the withholding of all stimuli, except the application of external warmth to the body, especially to the feet; the administration of purgatives and salines, and perhaps a few doses of calomel, with the local treatment already mentioned. It is desirable that the head and shoulders should be raised higher than usual in bed; that light and noise should be avoided, as well as every thing which is likely to excite or disturb the patient's mind.

On reaction taking place, blood may be safely taken from the system, and this abstraction of blood should be continued and repeated, in proportion to the strength of the patient, as long as the pain or excitement continue. In the cases so admirably described by POTT, this practice is fully illustrated, and my own experience has amply testified to its value; although, therefore, I have stated in the last section, that in concussion bleeding sinks the

pulse and the patient, it must be understood as applying only to the first stage of the symptoms, or that of depression ; as in the second stage, or that of excitement, there can be no doubt, not merely of the propriety, but in general of the absolute necessity of checking it, and thus of preventing or diminishing the subsequent inflammation, by abstracting blood. In SIR A. COOPER'S opinion, the nearer the part affected that the blood is drawn from the better ; he advises opening the temporal artery or jugular vein in preference to bleeding at the arm.

Opium is objectionable, unless bleeding has been carried so far as to give rise to restlessness, and other unpleasant symptoms, when a small quantity may sometimes be found beneficial ; but its effects should be carefully watched, and if not beneficial, its use should be discontinued. We are advised to combine it with antimony.* Blisters may be applied to the nape of the neck

* SIR A. COOPER'S Lectures.

and behind the ears, or upon the head itself, which may be repeated if necessary.

By this method we are most likely to conduct our patient to a speedy convalescence. But a continuance of rest, low diet, and aperients are required for a much longer period after this than most patients will be found willing to submit to, before the surgeon is warranted in considering the season of danger to have passed away. When local nervous affections, such as partial paralysis, squinting, or deafness remain after the patient has in other respects recovered, some good may be hoped for from electricity.

The second class of cases are those in which there is an interval of a few hours, or of a few days, between the accident and the symptoms. When the surgeon is consulted during this interval, he will be worthy of blame if he does not practically remember the precept of the father of medicine ;—

“ *Nullum capitis vulnus contemnendum.*”

so that though the patient may appear to have

sustained no injury, and protest against medical treatment, it is always proper to view his state with suspicion, and if possible to oblige him at least to remain strictly at rest, to abstain from solid food, to take some cooling and aperient medicine, and to allow himself to be watched for several days. But it unfortunately often happens that we are not summoned to attend these cases, until the symptoms have actually come on; it is then incumbent upon us to use our most thoughtful, and best directed energies to prevent, or to stem a torrent of inflammatory action, which will otherwise inevitably overwhelm our patient.

When symptoms have thus come on, some hours, or a few days after the accident, it is then necessary to adopt the plan of treatment laid down for the first class of cases, but with increased care and energy, especially as regard bleeding;—"of all the remedies in the power of art, for inflammations of membranous parts, there is none equal to phlebotomy; * * * *

and if any thing can particularly contribute to the prevention of the ills likely to follow severe contusions of the head, it is this kind of evacuation; but then it must be made use of in such a manner as to become truly a preventative; that is, it must be made use of immediately, and freely. * * * * In many instances, the timely use, or the neglect, of this single remedy, makes all the difference between safety and fatality.”*

I cannot forbear giving one more quotation from this most excellent practical writer, on this subject;—“Acceleration or hardness of pulse, restlessness, anxiety, and any degree of fever, after a smart blow on the head, are always to be suspected and attended to. Immediate, plentiful, and repeated evacuations by bleeding, have, in many instances removed these, in persons to whom, I do verily believe, very terrible mischief would have happened, had not such precaution been used. In this,

* POTT’S Works, Vol. II. page 55.

as well as some other parts of practice, we neither have, nor can have any other method of judging, than by comparing together cases apparently similar.”*

After the means which have been already pointed out, have been sufficiently persevered in, if the symptoms have not fully subsided, some further benefit may be hoped for from the use of counter irritation in various ways, as by blisters, mustard cataplasms, croton oil, &c. and by administering such medicines as the general state of the patient may seem to indicate. In many instances, the patient will in this manner be conducted through a perilous state to perfect recovery. Sometimes, however, these, like all other means, will fail, and symptoms of compression will manifest themselves, for the proper treatment of which I must refer my reader to the next chapter.

I come now to the cases comprised in the

* Ibid, pages 56, 57.

third class ; these are more insidious, and consequently more difficult to treat successfully than the last. Nothing alarming occurs for a long interval, during which the patient is not well, but he complains of little ; a slight head-ache, occasional giddiness, sometimes a disposition to vomit, a somewhat quickened circulation, perhaps an inflamed eye, languor of mind, and lassitude of body, loss of appetite, and of sleep, a skin rather hotter and a tongue rather drier than natural. Any of these symptoms a superficial observer will hope to remedy in a few days, but they continue, all remedies unexpectedly fail, one disappointment is followed by another, until the practitioner, as well as the friends of the patient, are suddenly awoke as it were, and alarmed by the too surely fatal symptoms of *pressure*. Let the surgeon then be on his guard ; let him anticipate, and if possible ward off the fatal blow ; in these cases nothing is more dangerous than a sense of security ; the slightness of the symptoms must

not be considered, but their continuance, and no treatment must be thought satisfactory, but that which entirely removes every complaint.

With regard to the particular measures to be adopted, the surgeon who is alive to the true nature of the case, will not find his difficulty arise in their selection, but in persuading his patient to submit to their adoption; here again, my own painful experience is confirmed by that of POTT;—"I am very sensible," he says, "that it will in general be found very difficult to persuade a person, who has had what may be called only a knock on the pate, to submit to such discipline, especially, if he finds himself tolerably well. He will be inclined to think, that the surgeon is either unnecessarily apprehensive, or guilty of a much worse fault."*

I have recently lost a case in this manner, which had been going on nearly three months, before the patient could be induced to think himself ill, and who died of compression ten

* Ibid.

days after ; when above three ounces of serum were found in the ventricles. I have already related the fate of my brother : I again refer to it as a beacon lifted up for the warning of others.

In the treatment of inflammation of the brain, following external injury, the first point then is to be careful *not to overlook its insidious progress* ; the second is to determine *the extent to which venesection should be carried*. To assist the judgment in this matter, the most attentive observation as to its effects, whether beneficial or otherwise, should be made.

Having spoken so strongly in my own language, and also in that of Mr. POTT, and SIR B. BRODIE, on the necessity there is for copious blood-letting, in many of these cases, I cheerfully join the latter in the caution that “we must not overlook the circumstance that this treatment may be carried too far ; and that we must endeavour to avoid the error

which some surgeons fall into of resorting to a too free use of the lancet. * * * * Where bleeding has been carried to a great extent, symptoms (for example, a hard pulse, headache and confusion of mind,) frequently occur which in reality arise from the loss of blood ; but which a superficial observer will be led to attribute to the injury itself, and concerning which indeed, it is sometimes difficult, even for the most experienced surgeon, to pronounce in the first instance, to which of these two causes they are to be referred.”*

A third question of importance is to determine the period *when opium may be advantageously given*. In some cases there is a fortunate moment in which, if the practitioner know how to seize it, opium will act almost like a charm ; whereas at another time, in the same case, it would do much mischief, strikingly illustrating that important aphorism of BOERHAAVE,

“ Nullum ego cognosco remedium,
Nisi quod *tempestivo usu* fiat tale !”

* BRODIE, *op. cit.* pages 381, 382.

Such is the view of the nature, symptoms, and treatment of the different cases of concussion of the brain, which my own observation and experience have led me to take; and which, I hope, my reader will think is sufficiently confirmed by our best authorities; it only remains, before I conclude this part of my subject, to make a few remarks on the *Prognosis* of these cases.

Slight fractures are more serious than slight cases of concussion, for the obvious reason that they are an indication of greater violence having been done to the head; but on the contrary, the more severe forms of concussion are more alarming and dangerous than extensive fractures; the brain having generally suffered more injury in the former cases than in the latter.

An attentive practitioner will always remember, that slight symptoms coming on some days or weeks after the accident, bring with them a far more serious indication of mis-

chief, than similar symptoms occurring immediately on the injury being inflicted; and also, that a patient who has suffered from concussion of the brain, in any of its forms, must not be considered really safe, until he has, for some time, remained perfectly well. SIR A. COOPER stated in his lectures, that “no patient is safe from the effects of concussion till fourteen days after the accident,” that is, I suppose, when no symptoms, or only very slight ones have arisen; but I should feel it to be my duty to watch a patient for a much longer period than this, before I could dismiss my feelings of anxiety about him.

The worst cases of concussion;—frightful fractures with depression;—laceration of the membranes and wounds of the brain itself;—and extensive extravasation in the substance or at the base of the brain, will probably, in all ages, baffle the most skilful treatment. But a good acquaintance with surgery in its present

state, with sufficient judgment, attention, and activity, will generally enable us to preserve life after accidents which fall short of these severe extremes.

Lastly, "affections of the brain produced by external violence, often induce a very complicated set of symptoms; are attended with imminent danger; and give much embarrassment to practitioners. Accordingly both with respect to the hazard with which they are attended, and the difficulty which occurs in the treatment of them, there is not perhaps any class of diseases to be compared with them."*

* BENJAMIN BELL, Vol. III. page 10.

CHAPTER II.

COMPRESSION OF THE BRAIN.

“EVERY thing,” says POTT, “relative to this kind of disorder is fallible and uncertain;”* I have already quoted this remark, but though surgeons have done much, since the days of POTT, to remove doubt and uncertainty, and to render the diagnosis of affections of the head more distinct, there is still so much truth in the observation that I think it well to repeat it. It is easy in the closet to trace out upon paper the symptoms of compression of the brain, and it is sometimes as easy to decypher them in practice, but it is often otherwise, even with every care which the attentive practitioner can bestow. But in an affair of so much im-

* Op. cit. p. 239.

portance, difficulty should only stimulate to exertion; and though the observing and skilful surgeon may sometimes err, an error from inattention or haste is always unpardonable.

■
In taking up the subject of compression of the brain, I am reminded of the first aphorism of LORD BACON;—"man understands as much as his observations *on the order of nature* permit him;"—*de naturæ ordine observaverit*;—the succession of nature; for it is important to observe in these cases, as indeed it is in every natural phenomenon, this order or succession.

It has been pointed out in the preceding chapter, that, when a fall or blow has produced pain in the head, insensibility, giddiness, vomiting or other urgent symptoms, *immediately*, and there is no evidence of fracture, we are to presume that it is a case of concussion: but that, if a short period elapse between the receipt of the injury and the coming on of these symptoms, it is a case of compression. That, if such

symptoms have occurred immediately, have then partially or completely disappeared, and have again come on; the first are to be attributed to concussion, and the last to compression of the brain. That, if the symptoms have been violent at first, and have gradually subsided, it is in all probability concussion; if on the contrary they have gradually become aggravated, it is compression. And lastly, that, if compression be suspected, and blood be cautiously taken from a vein, the pulse will usually improve, there will be at least a temporary mitigation of the symptoms, if the suspicion be correct; but the contrary will happen in concussion. In all these instances it will be perceived that their utility as diagnostic marks arises chiefly from observing the order or sequence of their occurrence.

The nature of the cause which has produced the injury will often assist us in distinguishing it; for instance, a violent shake of the whole

body is very likely to produce concussion but not compression of the brain ; on the contrary, a smart blow with a poker or a stone, will most probably give rise to compression.

But it not unfrequently happens that the same accident produces both these states of the brain, and then of course the symptoms of each are mingled together. Even here, however, attention will sometimes do more to unravel the intricacy of the case, than a careless surgeon would be willing to admit ; for example, by learning accurately, if possible, the mode in which the accident occurred. Not long ago, I was called to visit a collier who, while working in the pit, had a quantity of the roof over him fall on the back of his head, while he was engaged in pushing before him a small waggon, and being very much bent forward, his head was forced violently against a part of the waggon, so as to fracture the frontal bone. In this case concussion was caused by the earth falling upon the occiput, and compression from fracture

with depressed bone, by the iron against which the forehead was struck. Further details of this case will be found in the second section of this chapter.

When compression of the brain occurs immediately, or very soon after an accident, it is caused either by the rupture of vessels and the pouring out of blood within the cavity of the skull, which is called extravasation; or by depression with or without fracture of the skull itself;—this last may be caused by a fracture of the internal table of the cranium, when there is no outward appearance of fracture. When the symptoms of compression arise at a more remote period, they are most frequently produced by the formation of pus, or the effusion of serum, though they may have been caused by the extravasation of blood. Here then are three series of cases which require separate consideration;—compression from extravasated blood;—from depressed bone;—and

from abscess or effusion. They form the subjects of the three following sections of this chapter.

SECTION I.

COMPRESSION FROM EXTRAVASATED BLOOD. ITS NATURE,
SYMPTOMS, AND TREATMENT.

It is easy to understand the *nature* of this kind of compression of the brain. A violent blow on the head ruptures a blood vessel; the blood necessarily escapes, and makes room for itself by compressing the soft contents of the cranium, the bone itself being incapable of yielding. The blood usually soon coagulates, and thus the pressure becomes permanent.

The *seat* of this extravasation may be, first, under the bone and upon the dura mater; when thus situated it is generally found to

arise from a rupture of the middle meningeal artery, and it may therefore be suspected when the symptoms have been caused by a blow over the course of this vessel. Secondly, between the dura mater and the tunica arachnoides. Thirdly, between the last named membrane and the pia mater. Fourthly, upon the brain. Fifthly, within the ventricles. Sixthly, in the substance of the brain itself.

Examination after death teaches us that blood may be poured out and coagulated in any of these places; and when the accidents are very severe, in several or even in all of them together. But in the present state of our knowledge they cannot be distinguished from each other by the symptoms they give rise to during life.

We must, therefore, consider the *symptoms* of compression of the brain from extravasation in general, without reference to the particular seat of the effusion, though could we accurately

ascertain this, it would often remove our uncertainty with respect to the treatment. The symptoms resemble those of apoplexy, which is indeed generally the same state produced without external violence. Loss of sensibility, of motion, and of speech, more or less complete; a slow, oppressed, and sometimes intermitting pulse; a dilated or a contracted pupil, insensible to light; sterterous breathing; coma; paralysis; when the insensibility is not so great there will be vomiting, and the hand will be lifted to the head when loudly interrogated as to pain.

Such symptoms as these, especially if there be also bleeding from the nose or ears, either venous or arterial; and if there be evident marks of violence on the head, strongly indicate the mischief under consideration, when no fractured nor depressed bone can be discovered. SIR ASTLEY COOPER mentions in his lectures another symptom, namely, that the *muscles of the limbs are relaxed* in compression of the brain, which is not the case in concussion.

In the paper already referred to, the symptoms of compression of the brain are very carefully considered by SIR B. BRODIE. They are arranged as follows. 1. *Pain in the head.* 2. *Insensibility.* 3. *Paralysis.* 4. *Convulsive actions of the muscles.* 5. *Affections of the pupils.* 6. *Affection of the circulation.* 7. *Sickness and vomiting.* And his interesting remarks are concluded with a case of secondary hæmorrhage—the only one he had met with. This case I will take the liberty to transcribe.

“A man, thirty-five years of age, on the afternoon of the 8th of November, fell from a cart and struck his head against the pavement. A medical practitioner in the neighbourhood bled him, and he was afterwards brought to St. George’s Hospital, talking and reeling like a drunken man. He was again bled. On the following day he complained of head-ache, but was otherwise well. He continued without any symptoms until five in the morning of the

12th of November, when some of the patients in the same ward heard him talking incoherently. The nurse called the house surgeon to him, but before he could arrive the man had become insensible, and was found lying motionless with stertorous respiration and dilated pupils. Blood was taken from the arm, but the symptoms were not relieved, and he died in about half an hour after the commencement of the attack. On examining the contents of the cranium after death, a thin layer of blood was found extravasated in the cells between the tunica arachnoides and pia mater, where those membranes cover the posterior part of the two hemispheres of the cerebrum. In the lower part of the right anterior lobe of the cerebrum, the substance of the brain had been ruptured; and underneath this part, between the dura mater and tunica arachnoides, there was a collection of about two ounces and a half of blood. This last had all the appearance of a recent extravasation, and seemed to afford a

satisfactory explanation of the sudden alteration in the symptoms which immediately preceded the patient's dissolution: the hæmorrhage in the first instance, having in all probability been checked by the blood-letting which was resorted to both immediately after the accident, and on his admission into the hospital."*

I have stated, that in concussion of the brain it is not uncommon for an interval of a day or two to elapse before the symptoms come on. When compression has been produced, a short interval, an hour or two, for example, is what is commonly observed; but cases are occasionally met with, in which a much longer period will pass over before the pressure is manifested by the usual symptoms; instances of this are given by Mr. ABERNETHY; the following case occurred to me in 1839.

May 10th. Richard Garside, a stout healthy

* Op. cit. p. 358—9.

man, while driving his cart late at night, was attacked by two highwaymen, who kicked him severely on the head and face. He had a fracture of the upper jaw, several bruises on the head, and a wound over the left parietal bone, the bone itself being also slightly fissured. I saw him in the morning in consultation with two other medical men; he complained of nothing but the bruises about his face. The wounds were dressed, and in addition, he was freely bled. The next day he was so well that my proposal to repeat the bleeding was overruled. On the third day he complained of pain in the head, and was feverish; he was then bled; and again on the fourth day. On the sixth day he was decidedly suffering from compression, and the trephine was applied on the injured part of the parietal bone:—a coagulum of blood was found, but it was under the dura mater. He died on the eighth day.

Sometimes blood will be extravasated and

produce no symptoms at all ; and sometimes the immediate effect will be a fit of apoplexy, from which the patient will recover, and afterwards will be subject to fits of epilepsy, occurring at intervals for the remainder of life, though that may be prolonged many years. In other cases hemiplegia will be occasioned ; either temporary, from which the patient slowly recovers, or permanent. In other cases again less extensive paralysis, as of one arm for instance, an example of which I am attending at present, or of one or more of the senses, will follow. Sometimes the mind, and particularly the memory, will be affected in a remarkable manner. Many interesting cases, illustrating these remarks, are on record.

In the *treatment* of such cases of compression of the brain, the first place has always been given to the abstraction of blood ; it seems to be almost an instinctive impulse, and the caution needed is rather to avoid carrying this

valuable remedy too far, than to be careful not to omit it. In all ages blood-letting has been had recourse to in such circumstances. GALEN recommends sufficient to be taken to meet the urgency of the case, nearly “usque ad deliquium.” It was practised by PARE to a considerable extent; he gives an interesting and successful case in which he bled the patient, who had fallen with great violence on his head on a marble pavement, five times, and took away twenty-seven saucers full, in four days. SIR ASTLEY COOPER says, “blood-letting I consider the best and shortest step to take, and it must not be done with a sparing hand, unless it be directly contra-indicated.” It is strongly recommended and largely practised by JOHN and CHARLES BELL, by SABATIER, by DUPUYTREN, and indeed by all modern, as well as by all ancient authors, of real eminence.

I would, however, urgently press the necessity of bleeding *with attention*; that is, diligently watching its effect, and being very much

guided by that, as to continuing or repeating the operation. Shaving the head, or at least cutting off all the hair, and applying cold evaporating lotions freely and continuously to it, are generally the next things to be done, along with sinapisms or other stimulating applications to the feet. Active purgatives must not be omitted, and with them salines, antimonials and other cooling medicines may be given when the patient is in a condition in which he can take them. A very abstemious diet, such as a little gruel or milk and water, will be quite sufficient for a few days ; noise, and light, and excitement of every kind must be excluded as much as possible. This constitutes the treatment most likely to be beneficial in such dangerous and often fatal injuries of the head.

When these means actively employed fail to afford relief, and the patient is evidently in a desperate condition, there is still one remedy

remaining, namely, *the trephine*. This instrument has undergone, in its reputation, many reverses, and it is a matter of so much importance, that I intend to give it full consideration in a separate section of this chapter. I will, however, in this place, repeat the observation, that if the blow has been received in the course of the middle artery of the dura mater, the extravasation may be expected immediately under the bone, and consequently there is greater encouragement to perforate it in this situation than in any other. SIR A. COOPER, SIR B. BRODIE, and Mr. LAWRENCE confirm this opinion.

Before concluding this section, I will take the opportunity of removing a charge against MORGAGNI, arising from a misapprehension of a passage in his book, “*De causis et sedibus morborum*,” on this subject, made by our most estimable countryman, POTT. While endeavouring to prove that, “when the symptoms of

extravasation are the consequence of such external violence as leaves a mark where it was inflicted," it is right to give the patient the chance of recovery which trepanning affords, he observes that,—“MORGAGNI has treated this subject expressly, and has enumerated all the objections which may be made to the perforation of the cranium, in the case of effusion of fluid within it; but among others, he has mentioned a popular one, which prevails much among his countrymen, namely, the fear of having been thought to have destroyed those whom in the nature of things they could not save.” POTT then very justly and powerfully argues against the validity of this reason; but he appears to have mistaken the meaning of his author; the following is the passage as translated by Alexander;—“I do not doubt but you are much surprised that no mention is made of the cranium being perforated by the trepan; especially in those cities wherein very eminent professors of the surgical art have

flourished, who were accustomed formerly, as we learn from their writings, to afford this assistance with the greatest readiness to those who were wounded in the head.

“ Yet you will cease to wonder, when you consider the different fortune of so many remedies in different ages, and not only in different nations and climates, but in the same ; and especially those remedies which are of a cruel nature, and at the same time of an uncertain event, as this is. *The surgeons did not want readiness, dexterity, or courage :* but courage was rather wanting *to the patients, or their relations,* or others who were concerned ; as they (the friends) considered on the one hand, an operation which was cruel in its appearance, and on the other, the event, which was often so unhappy, that to the common people, and persons ignorant of the medical art, those patients who died might seem to have been killed by the method which was used in order to save them : which consideration, I suppose,

led them (the friends) *to withhold their consent* from the operation.”* So that Morgagni does not attribute this reasoning to the surgeons, but to the friends of the patient, and therefore Mr. POTT’s censure of him is undeserved.

SECTION II.

COMPRESSION OF THE BRAIN FROM DEPRESSED BONE.

THIS is a most important subject ; none can be more interesting to surgeons engaged in extensive practice. Fractures of the skull are indeed something like those medical cases which are called endemic, or peculiar to certain localities. Many medical men, in different parts of the country, may pass through life, and scarcely meet with a case ; in London such accidents are common, but they perhaps still more fre-

* MORGAGNI, De causis, &c. Letter LII.

quently occur in some manufacturing and mining districts. In such places undoubtedly an attentive surgeon has peculiar advantages for making himself practically acquainted with these formidable injuries, which he meets with in every variety. He may, by degrees, trace out to himself general observations and rules of treatment which are of essential service to him in his own practice, and may not be without value to other members of his profession, who less frequently have such cases to treat. It has been my lot to live in one of these districts, and I hope to be able to give a useful account of this species of compression of the brain.

The writings of the older surgeons, contain many lengthy chapters on fractures of the skull; but unhappily little really useful information can be found in them. They are so taken up with describing the different kinds of fissures, effractures, counter-fissures, succissions, recissions, and so on, that they do little else

than bewilder the reader. Since the days of SHARP and POTT however, more good sense has been shown; and the subject has been taken up and treated in a much more practical and useful manner.

In the last chapter, the greatest difficulty to contend with was the *diagnosis*; in the cases we are now considering, with one exception, there is seldom any difficulty in discovering their nature; they are for the most part easily made evident to the senses. On this subject it will be sufficient to make the following remarks.

First, it is very necessary to be on our guard against the deceptive appearances produced by a blow on the head, causing effusion into the cellular membrane, and under the tendon of the occipito-frontalis muscle, without injuring the bone. This gives rise to appearances exactly similar to those of simple fracture with depression, that is, a soft hollow centre, surrounded by a hard ridge, communicating such impressions to the

inexperienced eye and finger as will certainly deceive them. A careful examination will show, first, that the ridge is *above* the level of the adjacent sound bone; secondly, that the hollow is *not below* it; and thirdly, by pressing the finger rather firmly on the ridge, for a few moments, it will produce a pit or depression, and then the bone may be felt. In a short time the effusion is absorbed, and these deceptive symptoms disappear. With this exception, fractures of the skull are, in general, easily detected.

Secondly, in a doubtful case we are not justified in making a wound, where there is not one already, merely to ascertain whether there be a fracture or not;—unless urgent symptoms of pressure call for active interference to remove it.

Thirdly, where there is a wound and fracture, we ought to be very careful in our use of the probe, lest we push it, or a fragment of bone by it, so as to increase the injury done to the brain.

Fourthly, a fissure, or slight fracture of the cranium without depression, is not in itself dangerous, and does not require any peculiar treatment; the caution most needed, in such a case, is to avoid officiousness; and to prevent inflammation by carefully adopting the treatment I have explained in the preceding chapter.

And lastly, I may repeat the caution made so memorable by the confession of HIPPOCRATES, and the very beautiful commentary upon it by CELSUS; part of which I cannot refrain from quoting.—“A suturis se deceptum esse, HIPPOCRATES memoriæ prodidit; more scilicet magnorum virorum, et fiduciam magnarum rerum habentium. Nam levia ingenia, quia nihil habent, nihil sibi detrahunt: magno ingenio, multaue nihilominus habituro, convenit etiam simplex veri erroris confessio; præcipueque in eo ministerio, quod utilitatis causa posteris traditur; ne qui decipiantur eadem ratione, qua quis ante deceptus est,” &c.*

* CELSUS. Lib. VIII. § 4.

With respect to the different kinds of fractures with depression, it is sufficient for practical purposes to arrange them in two classes.

The first class consists of cases of depression, with or without fracture, but unaccompanied with symptoms of compression.

The second class comprises those cases of depressed bone in which there are also symptoms of compression of the brain, more or less urgent.

In each of these classes the fracture may be either simple or compound, that is, the integuments of the head may remain entire, or there may be a wound communicating with the fracture.

To these must be added those difficult and obscure cases in which there is a fracture with depression of the internal table of the skull, while the external one remains unbroken.

Of the cases arranged in the first class, those of simple depression, without fracture, occur

only in children; it has indeed been denied that such accidents are ever met with, I am however fully convinced that they are occasionally seen. Though the child may not appear to suffer any inconvenience from the injury, it is prudent to apply a few leeches, and an evaporating lotion to the head; to give aperients and salines; and to require rest in bed with a spare diet, for some days. It is also necessary that the little patient should be carefully watched for many weeks; and the parents should be instructed to give timely notice to the medical attendant, of any symptoms of compression, or of inflammation, which may arise at any time, however remote, from the occurrence of the accident.

In older persons, similar depressions of bone will be produced, but accompanied with fracture, and this to a considerable extent, and yet no alarming symptoms follow. I have seen cases in which the bone was depressed to a great extent, for instance, a cup-like hollow on

the vertex, three quarters of an inch in depth, and three inches in diameter, without the slightest unfavorable symptom appearing either immediately, or at any time after the accident. It is, however, always proper to bleed and purge, and to confine the patient to bed, and to a spare diet of liquids for some days; nor should he be lost sight of for some weeks. He should moreover be warned of the danger to which he is exposed, and required to be very moderate in his exertions, and very temperate in his mode of living. He should also be advised to apply immediately for medical assistance, should pain or any untoward circumstance arise.

Of course the greater or less rigour of this treatment must depend upon the extent of the injury, and the constitution and habits of the patient. Some will be disposed to think that, in any case of this kind, such treatment is too severe; but I feel bound to speak strongly on this point, and to assert that an apparent strict-

ness in the general treatment, is the true way to success in the management of such accidents.

A less active plan in the hands of VALSALVA and MORGAGNI was followed, in a frightful number of cases, by inflammation, abscess, and death ; and which drove the English surgeons of the next generation, at the head of whom was Mr. POTT, to some unnecessary scalping and trephining.

It is here, however, my duty to do for Mr. POTT what I have already done for MORGAGNI. Having endeavoured to remove from MORGAGNI a charge brought against him by POTT, arising from misconception, I must now rectify a misrepresentation of Mr. POTT, made by Sir B. BRODIE. In speaking of the use of the trephine in fractures of the cranium unattended with depression, Sir B. BRODIE observes that,—
“it seems to be the general opinion of modern surgeons that a fracture of the cranium where there is no depression, and no evidence of any considerable extravasation between the dura

mater and the bone, requires nothing beyond the strict antiphlogistic treatment, which ought to be resorted to in all cases of injuries of the head. * * * The application of the trephine under these circumstances has nevertheless been recommended by Mr. POTT. * * * But, first, Mr. POTT seems on the one hand, to have greatly over-estimated the danger of suppuration between the bone and the dura mater, in cases of simple fissure of the cranium ; * * * and, secondly, he seems on the other hand, to have under-estimated the evils which may arise from the removal of a portion of the cranium, *to which, in fact, no allusion is made in any part of his writings.*"*

I am quite sure that Sir B. BRODIE would not intentionally unjustly injure the reputation of his great predecessor, and I trust he will excuse me, if I endeavour to clear it from the charge brought forward in the last paragraph I have quoted. The passage in Mr. POTT's

* Op. cit. p. 412.

treatise is too long for me to insert entire, though it well deserves it, but the following extracts will be sufficient to show that Sir B. BRODIE was not correct in his assertion.

“The operation of the trepan is frequently performed in the case of simple fractures, and that very judiciously and properly; but it is not performed because the bone is broken, or cracked: a mere fracture, or fissure of the skull, can never require perforation, or that the dura mater under it be laid bare; the reason for doing this springs from other causes than the fracture, and those really independent of it. They spring from the nature of the mischief which the parts within the cranium have sustained, and not from the accidental division of the bone. From these arise the threatening symptoms; from these all the hazard; and from these the necessity, and vindication, of performing the operation of the trepan. * * *

“In order to obtain what information we can on this subject, we should consider, first, what

the mischiefs are, which may most probably be expected to follow, or which most frequently do follow, when perforation has been too long deferred, or totally neglected ; *secondly, what prejudice or inconvenience does really arise from, or is thought to be caused by, the operation itself, considered abstractedly ;* and thirdly, what proportion the number of those who have done well without it, bears to that of those who may truly be said to have been lost for want of it ; or of those to whom it might have afforded some chance of relief. * * *

“The second consideration which I proposed to be made was, what mischief or inconvenience may most reasonably be supposed to follow, or to proceed from the mere operation considered abstractedly. They who are averse to the use of it as a preventative, alledge that it occasions a great loss of time ; that it is frequently quite unnecessary ; and that the admission of air to the dura mater, as well as the laying of it bare, is necessarily prejudicial. * * * The hazard

which it is supposed may be incurred from laying bare the dura mater, is indeed a matter of some weight, *so much so that it certainly ought not to be done but for very good reasons.*

* * * These questions let those who have seen most business of this kind, and who are therefore the best judges, consider and determine. * * * *I should be sorry to be so misunderstood, as to have it supposed that I mean to say that I think the denudation of the dura mater a matter of absolute indifference, or that no ill can proceed from it; this I know is a point concerning which the best practitioners have differed, and concerning which we still stand in need of information.**

This I think is sufficient to prove that so far from “no allusion being made to the evils which may arise from the removal of a portion of the cranium in any part of his writings,” Mr. POTT has expressly, and at great length, considered the question. It is true that the

* Op. cit. p. 129—141.

“information” which he felt he needed, and which since his day, has been in some measure acquired, has tended greatly to diminish the necessity for the operation which there was in his opinion, from the information he had ; and it is now ascertained that if the general treatment to prevent inflammation, be sufficiently attended to, the cases we are considering, will almost universally do well without an operation. But I think there is much truth in the reflections of BELL, on the practice and writings of POTT ;—

“He saved by his dexterous operations hundreds of those who must have perished under the guidance of VALSALVA or MORGAGNI. He was engaged in that tumult of practice which left him little time to frame general laws ; yet he could not fail to act with good sense and skill in every individual case. He was sure to practise right, but in danger of teaching wrong, or at least imperfectly. * * *

Unless we were to take an ungenerous advan-

tage of a slight inaccuracy of language, and dispute the words of this author while we understand his sense, we must acquiesce in the principles he has laid down, and give him honour and praise, for the comprehensive and judicious views he has taken of what he saw going on around him ; for the honest and manly boldness with which he has declared his principles, so different to those transmitted to us by the writers of the preceding age ; and for the generous manner in which he has taken upon himself a responsibility of the most critical nature.”*

There are two other improvements which have been made on the practice of Mr. POTT, which well deserve our serious attention ; these are given us by the late Mr. HEY, in his “ Practical observations.” The first is the plan of making a simple or crucial incision, instead of the practice which has been called *scalping*,

* BELL, Surgery, Vol. II. p. 618, 619.

or removing circular portions of the scalp, in order to preserve as much as possible the natural integuments of the head. The second is the use of a small saw, instead of the trephine, in order to avoid the extensive removal of sound bone which that instrument occasions. The reasons for this change of practice, which are given by Mr. HEY, are most just and conclusive, and both suggestions are now so universally adopted by surgeons, that it is not necessary for me to repeat the arguments in their favour.

We come now to the second class of cases; depression with fracture and symptoms of compression, with or without wound. Of these every variety is met with, from a small fracture of the frontal or parietal bone, with slight depression, followed by vomiting once, and then little or no other affection,—to fractures of the most extensive kind, perhaps across half the head, or through the base of the skull, or the

driving in of nearly the whole of a parietal bone, producing the most formidable symptoms of insensibility, coma, and convulsions, and soon ending in death.

In such a variety of cases, it is not possible to lay down one plan of treatment applicable to them all; much must necessarily be left to the judgment, good sense, and experience of the surgeon in the management of each individual case. With respect to the general treatment, I may refer my reader to the foregoing sections; but I must again observe that I strongly recommend *the repeated abstraction of blood, in moderate quantities, at short intervals*, in order, if possible, *to prevent inflammation*; in preference to waiting until that mischief has actually commenced. I know that many surgeons adopt the latter course, but my own experience has been such as, not only to leave me without hesitation on this point, but to induce me to use my best endeavours to recommend its adoption by others.

The next most important question which presents itself, in these cases, is the necessity for trepanning, or at least for some operation to elevate the depressed bone. The experience I have had, leads me to advise that the depressed bone be elevated, whenever it is in a situation to be got at, even though it be necessary to make a wound to do so, *if serious symptoms of compression are actually present.* The conversion of a simple fracture into a compound one, and the removal of any portion of the cranium, are serious proceedings ; and the necessity must be apparent which will justify their adoption ;—that necessity appears to me to be the symptoms of compression being present. If, indeed, *these are not urgent*, blood-letting, the application of cold, &c. should be first tried ; and sometimes they will subside, and the patient will recover, without further interference. But should this not be the case, should the symptoms be urgent, or though less alarming, continue after venesection, then the surgeon is called upon to

attempt something more to rescue his patient from otherwise inevitable death.

As the considerations respecting this operation will be more fully entered into, in the fourth section of this chapter, I will now give the following cases, as examples of severe fractures of the skull with wounds, and considerable depression, and *some symptoms*, but which recovered without an operation being had recourse to.

1839, July 18th, nine p. m. Called to Squire Tordoff, aged 8, who had fallen on some stones. There was a contused wound immediately over the left eye, about the size of half-a-crown ; the bone was fractured at the edge of the orbit, and considerably depressed. Pulse 92, had not vomited ; pupil of the right eye dilated ; the swelling of the wound prevented the left eye being seen ; had not spoken much ; but was very restless and noisy when any attempt was made to examine the wound. Dry lint and

linen, wet with cold water, were applied ; and a small quantity of blood was taken from the arm.

19th. He has passed a tranquil night, but a very restless morning ;—sensible when spoken to ; but occasionally starting up. He has made water and had a motion. Pulse 92, but fuller than last night. Pupil of right eye contracts with light. Bled to about four ounces. Aperient, and cold lotion. Dressing not removed.

20th. Has had a restless night ; is sensible ; has pain in the head. Pulse 120 ; bowels have acted. Bled to four ounces ;—continue the lotion, &c.

21st. Slept eight hours ; sensible ; pulse 100 ; —salines.

22nd. Has had a very good night, greeted me with a smile ; bowels open ; pulse 90.

23rd. The same ;—continue.

25th. Laughed on seeing me ; pulse 104 ; no pain ; has slept well ; appetite very good, but allowed only milk ; talks quite sensibly ; bowels open—says he feels well.

26th. Unexpectedly found him up and dressed; he has passed an excellent night. Got the left eye-lid opened for the first time, eye apparently not injured; pulse 112; no pain; very cheerful.

27th. As yesterday.

29th. Appears quite well; pulse 108.

August 1st. The same; pulse 96; lint first applied still remains attached.

10th. He has walked to my house, (a distance of three miles,) the lint has come off; the wound is quite healed, and he appears in every respect well.

1841. He continues quite well.

1839, July 25th. Called to William Turner, a collier; a stout muscular man. While at work, a quantity of earth fell on the back of his head, and made him strike his forehead against a piece of iron. The os frontis was fractured, immediately above the nose; there was a wound leading to the fracture, about two

inches long; the bone was depressed about a quarter of an inch. The accident happened at eleven, a. m.; I saw him at home and in bed at four p. m. He had felt sickly, but had not vomited; no pain except in the right eye; pulse when first felt 80, afterwards 66; iris responded to the action of light; had never felt stunned nor confused; had taken nothing. I bled him to about twenty-four ounces; his pulse rose to 82, and felt relieved; a little plaster was applied to the wound, an evaporating lotion to the head, and an aperient given; nothing allowed except tea and gruel; the hair cut off.

July 26th. He has passed a quiet night, with some sleep; no pain, but a slight numbness in the forehead; the right eye has become black, but the pupils are natural; he has made water freely, and the bowels have acted once. No uncomfortable feeling beyond the numbness mentioned; pulse 56. Bled to about the same quantity as yesterday; pulse rose to 70; no

sickness produced. Continue cold lotion and saline aperient. Gruel.

27th. Has slept better; feels quite easy; bowels have acted well; pulse 56. Continue lotion, and take a saline, and gruel.

29th. Doing very well; anxious to get up; no pain; pulse 58.

August 1st. Found him up; he says he feels well; wound apparently nearly healed; pulse 58; the plaster remains on.

8th. He has walked down to my house, (a distance of two miles,) the plaster has come off; the wound is beautifully healed; and he says he feels quite well; pulse 96. He intends going to his work on Monday. Cautioned him to avoid beer, &c. Only a fortnight to-day since the accident happened. He has been *once* dressed; twice bled; and kept quiet, and almost without food, for a fortnight; and a formidable *compound fracture of the skull with depression*, is entirely and permanently recovered from!

1840, June 2nd. Thomas Talbot, aged 39, was firing an old gun, which burst, and the breech-pin struck his forehead, between the eyebrows, and penetrated it; other fragments destroyed the right eye. The breech-pin was extracted by a stander-by; he walked home a mile, and was put to bed. When I saw him he had vomited; his pulse was 60; the pupil of the left eye was sensible to light. The wound contained many fragments of broken bone, and the inner table was considerably depressed. About half a dozen fragments of bone were extracted with a pair of forceps; he had lost a considerable quantity of blood, from the wound, but he was bled in the arm to sixteen ounces. In the evening, he complained of pain in the head, and was again bled to sixteen ounces, and had leeches applied to the right temple;—pulse the same.

Wednesday, June 3rd. His bowels had been well moved with an effervescing aperient; and he had slept part of the night; said he felt

better; pulse about 62. He was bled to sixteen ounces, and required to take nothing, for several days, but water, and water gruel. The wounds were poulticed on account of the contusions.

On Thursday he complained of rather more pain about the eye, and had leeches again applied.

From this time no unfavorable symptom arose;—at the end of a fortnight he came down stairs, and continued doing well, until he had perfectly recovered.

There now only remain those obscure cases in which the inner table of the cranium is fractured and depressed, while the external one remains unbroken. Mr. POTT gives two cases; the following very interesting case occurred to Mr. S. COOPER, and exactly points out the line of conduct to be pursued by the surgeon, when similar symptoms present themselves.

“Amongst the wounded at the battle of

Waterloo, there was a soldier of the 44th regiment, who had been struck by a musket-ball on the right parietal bone, which was exposed, but had no appearance of being fractured. As, however, the symptoms of compression were urgent, and the patient was in nearly a lifeless state, I conceived it right to apply the trephine to the part on which the violence had acted. I had not sawn long before the external table came away in the hollow of the trephine, leaving the inner table behind, which was not only splintered, but driven at one point, more than half an inch, into the membranes and substance of the brain. No sooner were the fragments taken out with a pair of forceps, than the man instantly sat up in his bed, looked round, and began to speak with the utmost rationality. It is a most extraordinary fact, that this patient got up, and dressed himself, the same day, without leave from the medical officers, and never had a bad symptom afterwards. Immediately the operation was finished, the temporal

arteries were opened, and some purgative medicines exhibited.”*

Such brilliant success as this cannot often be expected, but when we are called to a patient labouring under the symptoms of *compression* of the brain, with a contusion, or wound on the head, and there is no fracture, we are to perforate the bone, in the hope of finding either extravasated blood, or fracture and depression of the internal table of the skull. I may, in conclusion remark, that the inner table of the skull is very frequently *more extensively fractured and depressed* than the external; and when this is the case, the difficulty of elevating the depressed portions, without doing injury to the dura mater and brain, is greatly increased.

* S. COOPER'S Surgical Dictionary. Art. *Trephine*.

SECTION III.

COMPRESSION OF THE BRAIN, FROM SUPPURATION.

A MAN receives a slight *wound* in the scalp, of which he takes little or no notice; the wound is superficially dressed, and he continues his usual occupation. In a few days the integuments of the head become sore and painful; in a little longer time, matter forms under the tendon of the occipito-frontalis muscle;—the pericranium becomes inflamed and detached from the skull;—the inflammation is communicated, through the bone, to the dura mater;—that membrane is separated from the bone; pus is formed on its surface; and the patient dies, labouring under the symptoms of compression of the brain.

In another case a man has his head *bruised*, by a blow or a fall: there is no wound; he is faint and sick, for a few moments, and then

recovers;—he thinks no more about the contusion. In about a week, he finds it necessary to apply for medical assistance; he complains of head-ache; loss of appetite; restlessness at night; a confused mind, and depressed spirits; his pulse is quickened; his tongue furred; and his bowels constipated. If happily the previous blow be mentioned, and the bruise examined, *a soft, circumscribed, puffy tumour* is discovered; a sure indication of the detachment of the pericranium from the outer, and of the dura mater from the inner surface of the bone. He is soon seized with a rigor; others follow with greater violence; the fever increases; the pain becomes excruciating; the mind more and more bewildered; the eyes redden; the countenance shows great distress; the hand trembles; again, there is a severe shivering; delirium, coma, and convulsions follow; and the tragic scene soon closes. Pus is found under the bone, and perhaps also in other parts, and the dura mater is in a sloughy state.

A third case is one of *concussion of the brain*, resembling, in the first instance, any of those described in the first chapter; inflammation commences; it advances insidiously; it is not checked by the treatment; and the fatal shiverings, delirium, stupor, paralysis, and convulsions, are a sure indication of the formation of matter within the cranium, and of the approaching catastrophe.

In a fourth case, there is *extravasation of blood*; in a fifth, *fracture of the skull*; and in a sixth, *extensive wounds and fractures*; but in all, unless inflammation be prevented, or remedied by the treatment I have already advised, suppuration, and death, under the distressing circumstances I have described, takes place.

When there is no wound, the *puffy tumour*, described by POTT, and afterwards very beautifully, by JOHN BELL, is the sure indication of the mischief within; but when there is a wound, the same intelligence is conveyed by a sudden change in its appearance. The edges

of the wound, and the granulations which before looked healthy, and were healing rapidly, assume an *unhealthy, sloughy aspect*, and the healing process is stopped. When the bone is exposed, it is dry, whiter, or yellower than natural, and *does not bleed* when scraped; the pericranium is found to be separated from it.

Whoever will contemplate the cases recorded by MORGAGNI, in his fifty-first and fifty-second letters, will find abundant confirmation of this melancholy picture. There, injuries of the head, of every kind, from the slightest to the most severe, are traced, one by one, to the same fatal termination. With little variation, the same symptoms recur; matter is formed; and death ensues.

Such is an abscess within the skull; in many respects it resembles abscesses in any other part of the body, but it differs from them in one most important particular;—there is no natural outlet. The bone does not give way, that the abscess may burst; at least such a method of

escape is not the ordinary event. I can, however, give a case in which the petrous portion of the temporal bone was perforated, and the matter discharged through the meatus externus.

An abscess may thus be formed in any of the situations in which, in other cases, extravasated blood is found, as I have pointed out at page 75, and, of course, it produces pressure on the brain, in the same manner.

Has the art of surgery any resource to offer for such cases as these, which, if left to nature, are utterly hopeless? Undoubtedly, the abscess may be opened by a perforation of the cranium; and if the matter be upon the dura mater, an escape is afforded, and life may be thus preserved. Many of the histories given us by POTT, are striking examples of this encouraging fact.

These histories, and the collection of fatal cases contained in the letters referred to, should be remembered, and ought to serve for each

succeeding generation. I have already promised to give an analysis of them in an appendix. The question of leaving, or not, such cases to nature, ought for ever to be set at rest, by these reports; and every surgeon should know, that they fully prove that to leave a case of this kind to nature is to consign it, without an effort, to the grave; while life might possibly still be prolonged, by an operation within reach.

The symptoms, and the appearance of the bone, in such cases, have been accurately described by the ancients, from HIPPOCRATES downwards. Mr. BELL observes, and it will be the uniform testimony of all experienced surgeons, that “of all the cases in surgery this is the least equivocal. Of those who have fractures of the skull, many, even in the most alarming circumstances, survive unassisted; but in contusion, followed by suppuration, unless the skull be perforated, unless the abscess be opened, all must die.”*

* Principles of Surgery, Vol. II. p. 598.

It is true, indeed, that some cases will occur in which there are great difficulties ; it is not certain where the matter is formed ; there is no puffy tumour ; there is no certain mark where the head has been injured ; or it has received so many blows in different parts, that no choice can be made of one ; inflammation of the membranes has been followed by inflammation of the brain itself, and the suppuration is internal ; it is *within* the membranes ; or perhaps even within the substance of the brain. In such cases an operation is not indicated ; there is no guide where to perform it ; and if performed it could afford no relief. But when, by the puffy tumour, or by the state of the wound, the place where to perforate can be clearly ascertained, the operation must not be delayed, but done immediately in the hope of finding the matter under the bone. When the piece of bone has been removed, the dura mater will be found smeared with cream coloured pus, or a larger quantity of pus will escape ;

and it may be necessary to remove more bone in order to give it a free exit. The symptoms will generally subside when the pressure has been thus removed, and in a short time the dura mater will redden and granulate, and heal, along with the wound of the integuments.

When this happy result has not taken place, and the patient dies, we find pus which has not escaped; and also generally a considerable quantity of serum in the ventricles. It is difficult to ascertain at what precise period this effusion takes place. In some fatal cases of compression, it is the only morbid appearance found; in these it may be fairly supposed to be the cause of the symptoms, and if so must have occurred before they appeared; in others it is thought not to have been effused until the patient was in articulo mortis.

In the course of lectures on surgery, given by Mr. LAWRENCE, at St. Bartholomew's Hospital, in 1830, he stated that he "did not recollect that he had seen any instance in which

matter had been let out from the skull under these circumstances," and he therefore inferred that such cases are very uncommon. From the increased attention which is now generally given to the treatment of the antecedent inflammation, such cases are happily not so common as they were formerly; but they do yet occasionally occur, and the danger of them is so imminent, that the surgeon ought to study them carefully, that, from the experience of others, he may be prepared to meet the difficulty, when it falls in his way; lest he be taken by surprise, and so not acquire the necessary information, till too late to be of service to his patient.

For the manner of performing the operation I will refer my reader to the next section, and now conclude this with the following cases.

1838. Sometime this year, a soldier in the army in Spain, received a sabre wound, on the left side of the head, above the ear, which

healed. In July, 1839, he was admitted into the Bradford Infirmary, for a copious purulent discharge from the left ear; a large abscess had also formed behind the ear, which was opened. He became delirious, or rather insane; and was so evidently suffering from compression of the brain, that an attempt was made to relieve him by applying the trephine above the ear. The bone was dead, and the dura mater detached from it, but no matter was found underneath it, though the dura mater was punctured with a couching needle. The man was, however, materially relieved for several days; he afterwards became worse and died. On examination a very large quantity, between three and four ounces, of matter was found in the brain, and a perforation through the petrous portion of the temporal bone, into the meatus externus; the matter had passed through this opening, and escaped from the ear. The opening made by the trephine, was just on the verge of the abscess, but did not open it.

In the third volume of "Transactions of a Society for the improvement of medical and surgical knowledge," published in 1812, page 106 is a "*Case of abscess in the brain, which discharged matter by the ear, by B. C. BRODIE.*" A boy about two years old had a discharge of matter from his left ear, and was deaf on that side; it continued till he was fourteen; the citrine ointment was used to suppress it, which it did; he suddenly complained of excruciating pain in the head; immediately after became insensible, and died in three or four days.

"In the left hemisphere of the cerebrum there was a cyst, about three inches in diameter, of a pulpy consistence, thick, and vascular, and containing a thick, dark coloured pus.

"The lower part of the cyst rested on the petrous portion of the temporal bone. There was a very small opening through the cyst, dura mater, and bone, forming a communication between the cavity of the cyst, and the meatus auditorius externus.

“The ventricles of the brain contained about two ounces of watery fluid.”

The author observes, “that an abscess should form in the brain, and discharge matter by the ear, is certainly not a frequent occurrence; nevertheless some other instances of this kind are on record.” And he refers to MORGAGNI.*

In this fourteenth letter of MORGAGNI, thus referred to, are several cases mentioned very similar to the one given by BRODIE. Young persons having discharges from the ear, for a long time; when after repeated attempts to put a stop to them, suddenly symptoms of compression of the brain come on; the patient dies; and matter is found in the brain over the petrous portion of the temporal bone; and that bone perforated through to the ear. There was also water in the ventricles. But it is remarkable that these cases are adduced in support of a view of the nature of such cases, exactly the

* Epist : Anat : XIV.

opposite of that given by BRODIE. "The abscess of the brain, was the consequence of the suppression of ichor flowing out of the ear ;
* * * nor could any one suspect, that this passage was made from the cavity of the cranium to the ear, notwithstanding he saw a pus of the same nature within the cranium : but on the other hand, every one who attended to the order of the preceding symptoms would confess, that its passage had been from the ear to the cavity of the cranium."

"Ulcers of the ears, therefore, are not to be hastily closed up, not so much on account of that circumstance which is more rare, I mean lest the exit of sanies from the cavity of the cranium to the ears be obstructed, as on account of that which is far more frequent, lest the exit of sanies from the ears themselves being obstructed, a caries be either generated or increased, and so much easier and sooner penetrate into the cavity of the skull." So that in MORGAGNI'S words, "the argument prefixed"

by BRODIE, "*aures purulentæ ab abscessu cerebri*, is foreign to the truth."*

SECTION IV.

THE OPERATION OF TREPANNING.

THERE are three questions of moment relative to operations upon the cranium which require to be investigated ;—first, *when* they are required, or, in what cases such operations are necessary; secondly, *where* or, on what parts of the cranium, they may be safely undertaken; and thirdly, *how* they may be best performed. These considerations form the subjects of the present section.

First, *what injuries of the head call for the manual interference of the surgeon, and require some operation to be performed upon the bone?*

* MORGAGNI Epist: XIV. §§ 2, 3, 4, 5, 6.

HIPPOCRATES* describes the operation of perforating the cranium by an instrument he calls *τρύπανον*. In his estimation the cases requiring it are, first, when there are dangerous symptoms following a wound of the head ; and secondly, fissures and fractures of the cranium. A fissure may be ascertained by pouring *ink* upon the bone, which will sink into the crack, and thus make it apparent. He would trepan all such cases, and he gives rules for its cautious performance.

CELSUS† is the next writer who speaks of the trepan, he recommends the use of it when the bone is diseased.

* HIPPOCRATES, de Capitis Vulner: It is believed that there were seven celebrated Physicians of this name, who flourished during a period of nearly three centuries. HIPPOCRATES II. to whom this treatise, “De capitis vulneribus,” is attributed, was the most famous; he was born 460 years, and died 370 years, before CHRIST.

† A. CORNELIUS CELSUS, De re medicâ. Lib: VIII. § 3, 4. He flourished in the reign of TIBERIUS, at the beginning of the Christian Æra. He was a contemporary of STRABO, HORACE, OVID, and LIVY; and lived very shortly after CICERO, and VIRGIL.

In the time of GALEN* the operation fell into disrepute, and during several centuries the use of this instrument was laid aside, on account of its apparent cruelty and want of success.

In the fourteenth and fifteenth centuries it was employed by itinerant operators, but still rejected by the regular practitioners.

1500. GUIDO† was the first to rescue the trepan from its state of neglect; it was afterwards taken up by others; and very soon used far too indiscriminately, in all cases of supposed injury of the *bone*; apparently without the true object of the operation, namely the relief of the *brain* from pressure, being understood.

1570. PARE.‡ The reasons he gives for trepanning are as follow;—

* GALEN of Pergamos. This most talented, learned, and famous Physician was born A.D. 131, and died in 201.

† Physician to Pope Clement VII.

‡ AMBROSE PARE, the most celebrated French surgeon of his day, was born in 1509, and died in 1590. His works were written in Latin and French, and translated into English by Thos. Johnson in 1665. Fol.

“First, to raise depressed bone, and to extract fragments.

Second, to evacuate blood and matter.

Third, for the fitter application of medicines.

Fourth, that so we may have something whereby we may supply the defect of a repelling ligature.”

1607. GUILLEMEAU* gives the same advice as his preceptor PARE.

1646. FABRICIUS HILDANUS† also adopted similar views.

1732. GARENGEOT‡ insists upon the operation being performed when the symptoms require it, even when there is no fracture at all ; he reports several of such cases in which the internal table alone was fractured.

* GUILLIMEAU was born in 1550, and died in 1612. He was surgeon to the king of France.

† GULIELMUS FABRICIUS HILDANUS, was born in 1560.

‡ RENE-CROISSANT GARENGEOT, professor of surgery at Paris, was born in 1688, and died in 1759.

1735. HEISTER* began again to limit the number of cases in which the trepan is required. He forbids it except in cases of wounds of the head followed by alarming symptoms; and even when performed, he thinks that the result is generally fatal.

1737. LE DRAN† also forbids the operation in cases of concussion; and about this time, indeed, it once more falls into disrepute and its use is neglected, but it is soon revived in England.

1750. SAMUEL SHARP,‡ states the objects of trepanning to be;—

“First, to raise any pieces of bone that by violence are beaten inwards upon the brain.

* LAURENCE HEISTER, F.R.S. professor of physic and surgery in the University of Helmstadt, was born in 1683, and died in 1758.—“Surgery,” in 4to. p. 144.

† HENRY FRANCIS LE DRAN, “Observations de Chirurgie.” Contemporary with PETIT and HEISTER.

‡ SAMUEL SHARP, F.R.S. and surgeon to Guy’s Hospital. Author of two publications much esteemed, namely, “A Treatise on the operations of Surgery, 1743;” and, “A critical Inquiry into the present state of Surgery, 1750.”

“Second, to give issue to blood or matter, lodged in any part within the cranium.

“Third, in concussions producing violent symptoms, there is no pretence for neglecting the trepan, but not being able to learn in what part the concussion is.”

“When assured of fracture or depression, though the symptoms in a great measure go off
* * * it is always advisable to trepan as soon as possible.”

1788. POTT;*—His reasons are

“First, an extravasated fluid to be discharged.

“Second, a depressed bone to be elevated.

“Third, matter formed between the skull and dura mater to be let out.

“Fourth, the inflammatory tension of the membranes to be prevented.”

1790. JOHN HUNTER.† That this great man thought frequent interference necessary, is

* P. POTT, F.R.S.;—see note at page 24.

† JOHN HUNTER, F.R.S. was born in 1728, and died in 1793. See his works, published by J. F. Palmer, 1835. Vol. I. p. 486—497.

evident from his directing the operation even in the following cases ;—

First, in young children in whom there was depression without symptoms.

Secondly, in cases of depression of the outer table only.

Thirdly, “in cases of fissure only, it may be more advisable to trepan, *as the operation can do no harm.*”

Fourthly, “in all cases of violence attended with compression, either from fracture or not, the trepan is absolutely necessary.”

Fifthly, in fractures of the base of the cranium.

1791. RICHTER,* and BENJAMIN BELL† were the first, once more to moderate this excessive use of the trepan ; the directions of the latter are ;—

“To apply the trepan wherever it is indicated *by symptoms of a compressed brain* ;—but only

* AUGUSTUS G. RICHTER, Professor of Surgery at Gottingen in 1770.

† BELL ;—see note at page 23.

when such symptoms are present; *never to prevent them.*"

1804. HEY.* The object of trepanning is;—

“First to extract broken fragments of bone.

Secondly, to elevate what is depressed.

Thirdly, to afford a proper issue to blood or matter, that is, or may be confined.”

1822. DUPUYTREN† The sentiments of this highly talented surgeon are thus expresssd;—

“Aussi long-temps que les plaies de tete ne sont accompagnees d’ aucun accident cerebral, il faut se borner a un sage expectation, et les traiter comme des plaies simples. * * *

C’est la compression cerebrale qui peut seule engager le chirurgien a recourir au trepan. Mais alors l’ indication est aussi pressante que

* WILLIAM HEY, F.R.S. and Senior Surgeon to the Leeds Infirmary, was born in 1736, and died in 1819. “Practical Observations in Surgery.”

† BARON DUPUYTREN, Surgeon in chief to the Hôtel Dieu, was born in 1777, and died in 1835; the passage above quoted will be found in “La Médecine Opératoire, par R. B. SABATIER. Ed. par SANSON & BEGIN, 1822. Tome II. p. 42.

positive." He rarely, however, performed the operation. I had the great pleasure of being his pupil for a year, but never saw him trepan.

1826. Sir A. COOPER.* We were instructed by this eminent teacher to trepan;—

“First, simple fractures when urgent symptoms exist.

Secondly, compound fractures with depression, *whether there be any existing symptoms or not*;—to prevent inflammation. (Sir B. BRODIE at first opposed, but has since supported this view.)

Thirdly, for extravasated blood under the bone.

Fourthly, for matter.”

1828. Sir B.C. BRODIE advises trepanning for;

“First, simple fracture with depression, producing symptoms of compression manifestly endangering life.

* Sir ASTLEY PASTOR COOPER, Bart, F.R.S. Consulting Surgeon to Guy's Hospital, was born in 1768, and died in 1841.

Secondly, hæmorrhage between the dura mater and bone, producing symptoms of pressure. This arises generally from the meningeal artery, or one of its principal branches. In this latter case much more bone should be removed than in the first.

Thirdly, simple fracture with extensive or deep depression, should lead to the application of the trephine, *although there are not symptoms of compression.*

Fourthly, the same should be the treatment of compound fractures."

1830. LAWRENCE states in his lectures that ;—

"We are not to have recourse to the trephine, except where there is depression of the bone, *and that depression of the bone is accompanied with symptoms of pressure on the brain.*"

"In all cases of fracture with depression, whether the depression be little, or whether the depression be great, unless symptoms be present indicating pressure on the brain, it is not

judged right to proceed to the operation of trephining it."

I have thought it well to place before the reader this sketch of the history of trepanning, in order to point out clearly the present state of the question. I have no doubt that the practical surgeon will consider it interesting, and will study it with attention. He will observe how the profession has vibrated from one extreme to the other, and he will also clearly ascertain its present position; respecting which the following statement may be made.

That it is now unanimously agreed upon, on the one hand ;—

Not to trepan in cases of concussion ;

Nor in cases of compression of the brain, unless there is very good reason to expect extravasated blood immediately under the bone ; fracture of the internal table ; or pus, indicated by the puffy tumour, or detached pericranium.

Nor in children where there is depression only, without fracture.

Nor in simple fissures or fractures with slight depression, but without alarming symptoms ;

Nor even in compound fractures without depression or symptoms ;

And on the other hand ;—

To perforate the cranium when extravasated blood or matter may be fairly expected to be found underneath ; and to raise the depressed bone, in all cases of depression, whether simple or compound, where there are serious symptoms of pressure.

But it still remains an unsettled point whether,

A simple fracture with extensive or deep depression, but without symptoms of pressure, and,

A compound fracture with depression, but also without symptoms, should be trepanned or not.

For such a proceeding we have Sir A. COOPER, and Sir B. BRODIE ; *against* it, DUPUY-

TREN, and LAWRENCE ;—and the arguments used on each side of the question, by these distinguished and experienced men, are of great weight. I do not flatter myself that I can decide the question, as to the general rule ; though I have not lately had any difficulty in making up my mind, in any individual case. I will only observe, that my decided preference has gradually become, more and more, *for non-interference ; that by strict attention to the means for preventing inflammation*, I have great confidence in such cases doing well, with the fracture left undisturbed ; and that, therefore, unless I found that the depressed bone could be very easily raised, or the detached fragment removed without increasing the damage done to the dura mater, *I should not venture to do it.*

The second question relative to the operation of trepanning is *where may it be safely performed ?*

It has been usual, in all surgical works, to point out certain parts of the cranium, where the trepan ought not to be applied. It will be useful to consider each of these forbidden places.

First, we are directed to avoid *the sutures*. This prohibition is even yet sometimes given, though the reason formerly assigned for it, would not now be acknowledged;—"vitandæ sunt suturæ, quia per has dura mater exit ad pericranii generationem!" In cases of serious injury to the head, such as those now under consideration, it is mere trifling to represent the sutures as an impediment to any proceedings which, on other accounts, may be deemed necessary.

Secondly, we are required to avoid the *sagittal suture*, on account of *the longitudinal sinus* underneath it. But this prohibition is unnecessary, and must not stand in the way of any useful operation. I have seen the sinus wounded by the fractured bone, which was ex-

tracted without harm ; and it has been punctured by POTT, WARNER, and CALLISEN.

Thirdly, we are to avoid *the artery of the dura mater*,—the middle meningeal artery. But this, like the preceding prohibitions is the effect of timidity, or the suggestion of the closet, not the result of observation or experience. Should the fracture require any operation in the course of this artery, it must not be shrunk from on that account. And in a case of extravasated blood, produced by a blow on the course of this vessel, there is the greatest encouragement to apply the trephine in this situation ; as it may be hoped that the blood may be found under the bone, and upon the *dura mater*. I believe there has never yet been any difficulty in arresting the hæmorrhage, even when the artery has been wounded.

A fourth direction is to avoid *the frontal spine* and also *the frontal sinuses*. The presence of these parts ought, of course, to be remembered in all cases of injury near them ; but I

should not be deterred from performing any operation I judged necessary, merely because these happened to be in the way.

Fifthly, *the occipital bone* is also objected to, because both its internal and external surfaces are very uneven; and also on account of the great sinuses running underneath it. But, in the first place, this bone, from its strength and position, is seldom fractured, and in the second place, when such an accident occurs it is generally so tremendous, that the patient is killed; so that the surgeon is rarely called upon to exercise his judgment upon these objections; which, however, are rather arguments for additional care, than hindrances to the elevation of a depressed portion of bone.

It appears, therefore, that in any case, in which an operation is clearly indicated, it may be undertaken *wherever it is practicable to perform it*; and that the directions which have been frequently given, relative to this question, are not more useful than the descriptions of the

different kinds of fissures and fractures, and the various methods of detecting them, which, to the discredit of our profession, have been, for centuries, gravely written in our surgical works.

In the place of these laborious but useless descriptions, I hope the observations I have now laid before the profession, in addition to those of some other modern publications, as to what it is really important for the surgeon to attend to, will contribute to the welfare of those persons who are so unhappy as to meet with such serious accidents; and also to the satisfaction of the practitioner of good sense and humane feeling.

The third question remains :—*How may the operation be best performed?*

When the object is to raise a fractured and depressed portion of bone the trephine is not now required. We are indebted to the late Mr. HEY, of Leeds, for introducing a method

of elevating these depressions, by which the loss of sound bone which the trephine occasions may be almost entirely avoided. The saw which now goes by his name, (though as Mr. HEY himself observes, it is figured in old works on surgery,) is too well known to need a description here ; it is very convenient ; and with it, a small margin of bone may be removed, which will allow an elevator to be passed under the depressed portion, so that it may be carefully raised. I have used this saw in a great number of cases, and always with satisfaction. The only objection to it which can be raised is that it is sometimes rather tedious ; in these cases, perhaps, a small chisel, (such as we use in necrosis of the tibia,) might be more expeditious.

To remove no scalp, and as little sound bone as possible ; to avoid injuring the brain or its membranes ; and at the same time, if possible, completely to remove the cause of compression ; —are the most important precepts to be borne

in mind, while performing the operation. A considerable quantity of blood is commonly lost from the wound, which is generally advantageous to the patient. The dressings ought to be of the simplest character, and not removed without real necessity.

We must now consider the operation as performed with the trephine; the cases which require this are, generally, cases of extravasation under the bone, or of suppuration.

The head must be shaved, but the precept of POTT, and other eminent surgeons, to remove a circular piece of the scalp must not be followed. Such a step would cause a useless waste of valuable integument, which becomes doubly precious after the removal of the bone underneath it. A T incision, or at the most, a crucial one, will answer every required purpose, and will admit of the flaps being replaced and adjusted, after the operation is over, so as to form a perfect covering.

It is not necessary to describe the trephine, nor the manner of using it ; the whole process of perforation should be carried on with great care, both on account of the absence of the diploe in many parts of the cranium, and because the bone is often extremely irregular in its thickness, even in a space as small as the crown of a trephine. Too much caution cannot be employed ; a very fine probe or a tooth pick, should be frequently introduced to ascertain if the bone be perforated in any part of the circle.

The circular piece of bone having been thus removed by the trephine, the dura mater is exposed to view ; when the extravasated blood or matter, which has been sought for, if present, can now escape, and thus a chance of life is afforded which could not have been given in any other way. The integuments should be replaced over the wound, and the lightest and simplest dressings are the best.

If irritating applications be obtained from,

and the general treatment of the patient well attended to, *so as to prevent inflammation*, I believe we shall seldom be troubled with that formidable appearance known by the name of *hernia cerebri*. This is a fungous growth from the brain or its membranes, which protrudes through the opening in the bone, so as to prevent the healing of the wound. When such an untoward circumstance does arise, I think gentle pressure, with some mild dressing, answers the best; but under any treatment such a case will often terminate unfavorably.

CHAPTER III.

WOUNDS OF THE BRAIN.

I MUST now, in this third chapter, give some account of another series of very formidable, and frequently fatal injuries of the head. In these cases, not only is the skull fractured, but the membranes of the brain are torn, and the substance of the brain itself is found to be injured, part of it being often seen lying on the outside of the wound.

I have, from time to time, witnessed this sad spectacle ; and truly seldom is a fellow creature in circumstances more strongly calculated to excite the sympathy, or to call for the prompt assistance of the medical attendant.

It might be supposed, indeed, that it would be impossible to survive such grievous injuries

as those we are now considering ; and no doubt many such accidents prove fatal ; it is however equally certain that many recover. I have been deeply interested while witnessing, in my own practice, some most encouraging examples of this truth. The splintered and depressed bones have been carefully removed, in the manner described in the last chapter ; the integuments replaced as much as possible ; the circulation repressed by the repeated abstraction of blood ; inflammation checked by every possible means ; and by patient and persevering attention for some weeks, a cure has been effected.

Instead of giving any of my own cases, I will insert the following, which I have lately read in the *Edinburgh Medical and Surgical Journal*, for two reasons ; first, because it very closely resembles several cases I have attended, and a similar method of treatment was adopted for it ; and secondly, because, being an independent testimony in favour of repeated

blood-letting, it will tend to confirm what I have so strongly recommended.

1825. “Mr. MEEN, a farmer in this neighbourhood, was wounded in the head by the breach-pin of his gun, which was blown out in the discharge of the piece. The breach-pin was driven through the hat, and piercing the os frontis, a little to the left of the spinous ridge of that bone, and about an inch and half above the edge of the orbit, entered the brain to a considerable depth, carrying before it a circular piece of the hat, and several splintered pieces of bone.

“The young man was knocked down and stunned by the blow, but he soon recovered sufficiently to walk, with but little assistance, to the nearest house, from whence he was conveyed, in a cart, to his own residence, a distance of two miles.

“I found him sitting up in his chair, and able to converse on the subject of his accident. The

breach-pin had been withdrawn from the skull by the removal of the hat; and as there appeared to be no bleeding, a piece of sticking-plaster was laid over the wound, to exclude the air, whilst a messenger was sent for my instruments. In about ten minutes the patient was seized with a distinctly marked fit of epilepsy, which ceased immediately on the removal of the plaster, under which a little oozing of blood had taken place, the slight pressure of which had thus disturbed the functions of the brain, whilst the severe injury it had sustained from the accident, had been productive of but little immediate inconvenience.

“On raising a sufficient portion of the integuments, by a crucial incision, it was found that the opening through the os frontis was so large, and that the fractured bone was divided into so many pieces, as to render the use of the trephine unnecessary. At the depth of about an inch in the brain, a hard substance was felt at the end of the probe, which, on extraction,

proved to be a circular piece of hat, of the shape and size of the end of the breach-pin. Several angular pieces of bone were then carefully removed, some of them of considerable size ; and as they were completely buried in the brain, some portions of that organ were necessarily brought away with them. After the removal of every foreign body, the integuments were laid down, the wound was dressed superficially, the patient was freely bled, some aperient medicine was given, and he was put on the most abstemious regimen. *On every increase of pain or fever, the bleeding was repeated,* with uniform relief, the bowels were kept freely open, and water-gruel formed his only diet. Under this treatment the recovery was scarcely interrupted by one untoward symptom. The jagged surface of the brain was gradually thrown off in an offensive discharge, the loss of substance was slowly restored, and there was not the slightest disposition to the production of fungus.

“The patient perfectly recovered; but he has since had two or three epileptic attacks, to which he had never before been subject.”

In the valuable paper of Sir B. BRODIE, in the *Medico-Chirurgical Transactions*, already more than once referred to, a collection of thirty-eight cases, from various authors, is analysed, in order to show that “in the very great majority of cases of wounded brain, there seems to be more wisdom in resorting to negative, than to active local treatment.” In several of these cases, foreign bodies, or splinters of bone, were allowed to remain, without being extracted, and the patients recovered.

In the cases which have fallen under my care, I have hitherto pursued a different course, and the majority of them have recovered; I regret that I have not accurate notes of them all, so that I might be able to say precisely in what proportion.

The question of removing fragments of bone or of foreign bodies can only be entertained,

when those fragments are so loose as to be extracted without doing further injury to the brain; the result of my own practice is in favour of their being removed; while the result of my reading is, on the contrary, in favour of their being left. There can be no doubt of the propriety of leaving, unmolested, all cases where the depressed bone, or the foreign body, a bullet for example, is so circumstanced that, to extract it, the brain must suffer still further laceration.

It will perhaps appear, *prima facie*, that I have pursued an opposite course of practice in these cases to that recommended in the preceding chapter; but when it is considered how different the cases are;—that in the former, the brain is only *pressed upon*, and that without its giving evidence of suffering; while in the latter, it has a sharp jagged edge of bone continuously *puncturing* it;—it will not then appear surprising if a different mode of treatment be thought necessary.

I have one further remark to add, in reference to these, and all other fractures of the skull, where the patient recovers with loss of some portion of the bony covering of the brain. It is highly necessary *that the patient should be provided with a metallic covering for the part which has lost its bony protection*, before the surgeon takes leave of him, and before he is allowed to go much out of doors, or to engage in any active occupation or amusement. The necessity for this precaution is rendered painfully evident by the following case.—

1828. A boy about eight years old, received a severe blow on the left parietal bone by the fall of a coal, while employed at the bottom of a pit. I found a large wound, a comminuted fracture of the bone, and a laceration of the dura mater; he was in a state of extreme exhaustion, and in fact, it seemed a hopeless case. I removed the splintered bone, and lightly dressed the wound, and to my great surprise

and delight, the boy recovered. He got out of doors, before I was aware of it, and, boy-like, engaged in full play, with some of his companions; he was struck by a stone, on the very spot where the bone had been removed, and he died in a few days.

I mention this painful circumstance, believing that it will produce as strong an impression on the minds of other surgeons, as it has upon my own; and in the hope that we may be able so to put our patients on their guard, that a similar catastrophe may, in future, be prevented. A small plate of tin, or other metal, may be made to fit over the part without difficulty. I am at present attending a case of this kind, in which, in consequence of a blow from a stone, received nearly three years ago, several large portions of the parietal and temporal bones have exfoliated, and have been extracted, by which the dura mater is exposed to a great extent; it is now protected by a large metallic plate which is constantly worn.

An exceedingly interesting investigation connected with wounds of the brain is the question, *how far is the intellect affected by them?* But, unhappily, little satisfactory information can yet be given in reply. Indeed I fear the inquiry still remains almost as little elucidated as ever. I had nearly said that the result of my own observations is entirely negative; the cases I have seen, however, establish one point of importance, namely, that considerable portions of the brain, for example, two or three teaspoonsful, or even much more, may be lost without evidently affecting the intellect,—at least immediately. The following case is an illustration of this fact.

1838. An old man was driving a heavily laden cart; a chaise came very rapidly past him; he was knocked down; and, apparently, the wheel of his own cart went over his head, producing an extensive compound fracture over the left eye. When I saw him, a few

hours after the accident, several portions of brain were lying on his cheek, and others were mingled with the matted hair. Yet this poor man, after receiving the injury, had got up by himself; had driven his cart, when it was almost dark, nearly a quarter of a mile, to its station; had emptied it of its materials; and had taken others into it instead; he had afterwards driven it some hundred yards, to his own house; and had gone into his house for the key of the stable, before he became sick. He was then helped into bed, and remained there till I saw him. Before I reached him, he had one or two rather violent convulsions, and became extremely restless. The injury done to the brain was frightful. I removed the splintered bones, and placed a little dry lint over the wound, and he became much more tranquil. The next day I was not without some hope of his recovery, but the day following the convulsions returned, and he shortly afterwards expired.

I have already spoken of *hernia cerebri*. Such

tumours are sometimes composed of true cerebral matter, and sometimes of a mass of coagulated blood, and of a sloughy substance, which can scarcely be called organised. I have seen a few cases, in the practice of other surgeons, but have never had one in my own. Is it fair to consider this circumstance as a proof of judicious and successful treatment? For further information, therefore, respecting these formidable protrusions, I will refer my reader to a paper by Mr. STANLEY, in the *Medico-Chirurgical Transactions*, Vol. VIII. and to other surgical works.

I have now endeavoured faithfully to lay before my readers, the result of my observations on the most serious injuries of the head ; together with such reference to works of authority, as appeared sufficient to confirm those observations. It is my belief that the principles I have attempted to elucidate, are founded upon experience ; and it is my hope that they will prove of service to some of my fellow-creatures ;

and that the manner in which I have discharged this duty, will be acceptable to my professional brethren.

In conclusion, it may, perhaps, be necessary to apologise for the brief biographical notices of eminent men which I have given;—they have been suggested by feelings of respect for men of talent, who have devoted themselves to our useful profession, and are added for the sake of those who feel an interest in such recollections, but find it difficult, at the moment they are needed, to know where to find them. With regard to the imperfections in the execution of my work, which will doubtless be discovered by those who have leisure to peruse it critically, it may suffice to remind them, that it has been written in the midst of the distractions and interruptions of daily practice; which, indeed, would have discouraged me altogether, had I not wished to put upon record, the practical results of a great many observations.

“Feci quod potui, non ut volui.”

APPENDIX.

ABSTRACT OF FATAL CASES

GIVEN BY

MORGAGNI,

IN LETTERS LI. AND LII. OF HIS WORK

ON THE

CAUSES AND SEATS OF DISEASES.

AND A NOTICE OF

POTT'S CASES

GIVEN IN HIS

OBSERVATIONS ON INJURIES OF THE HEAD.

| No. | Sex. | Age. | Day of Death. | Nature of Accident. | What part injured. |
|-----|--------|-------|---------------|-------------------------------|-----------------------------------|
| 2 | Male | 16 | 14th | Struck with a stone. | Left part of the sinciput. |
| 3 | do. | 60 | | do. with a stick. | Side of the forehead. |
| 5 | do. | 30 | 25 | Cuts. | Forehead and occiput. |
| 6 | do. | 60 | | Fell in epilepsy. | Left side of the head. |
| 7 | do. | 40 | 20 | Fall from an elevation. | Left eye bruised, &c. |
| 9 | do. | 70 | 30 | do. | Right side of the sinciput. |
| 11 | Female | 40 | 40 | do. | Left side of do. |
| 12 | do. | 25 | 28 | Fall on a stone. | Left side of the forehead. |
| 14 | Male | 18 | 11 | Blow by a stone. | Sinciput. |
| 15 | do. | 18 | 15 | Wounded. | Upper part of the forehead. |
| 17 | do. | 26 | 14 | Blow by a stone. | Right side of left eyebrow. |
| 18 | do. | 13 | 25 | do. | Right part of the sinciput. |
| 19 | do. | Young | 60 | do. | Left side of do. |
| 20 | do. | 50 | 22 | Blow with a stick. | do. do. |
| 21 | do. | | | | Right side of head. Meninges cut. |
| 25 | Female | 50 | 22 | Blow with a stick. | Back part of the head. |
| 26 | Male | Young | 13 | do. | Upon the sagittal suture. |
| 27 | do. | 30 | 19 | Blow with a blunt instrument. | Left side of lambdoidal suture. |
| 28 | do. | 60 | 23 | Fall from an elevation. | Under angle of do. |

| Symptoms. | Appearances. |
|--|---|
| 11th day, fever, coldness, &c. | No fracture. Pus between dura and pia mater. |
| 6th day, fever with rigor, &c. | do. Membrane sanious & thickened. |
| "A vain irritation to vomit." | 3 ij of sanies between bone and dura mater. |
| Vomiting, weak, dull and heavy. | Coagulum between left os petrosum and dura mater. |
| 12th day, fever. 14th, convulsions. | Small portion of brain discoloured, &c. |
| 20th day, fever, rigor and vomiting. | Pus between dura and pia mater. $\frac{3}{4}$ of serum in ventricles. |
| 30th day, do. do. 34th, Apoplexy. | Pia mater sanious. Brain brownish. |
| Fever from the first. Idiotic. | Outer table fractured. "Serous colluvies." |
| 6th, Fever. 8th, coma. | Icterus. Pus between bone and dura mater. |
| 11th, do. 15th, Delirium, &c. | Sanious matter between dura and pia mater. |
| 4th, do. 7th, do. Coma, &c. | Fissure. Pus between dura and pia mater. |
| Vomiting. 14th, fever. 20th, delirium. | Fracture and depression. Serum. |
| 20th, Fever. No delirium. | Disjunction of sagittal suture. Abscess under dura mater. |
| 14th, do. rigor, cough. | Head sound. Chest and liver full of pus. |
| Delirious and paralytic. | Abcesses in brain, lungs and heart. |
| 14th, Fever and rigor. | Lambdoidal suture separated—clot within. |
| 12th, do. do. and convulsions. | Slight sanies on dura mater—pia mater pale. |
| 11th. Epilepsy, convulsions, paralysis. Sense remained. | $\frac{3}{4}$ ss of pus between dura and pia mater. |
| 7th. Paralysis. Coma. | Disjunction of lambdoidal suture. Pus between dura and pia mater. |

| No. | Sex. | Age. | Day of Death. | Nature of Accident. | What part injured. |
|-----------|--------|-------|-----------------|--------------------------------|-------------------------------|
| 30 | Male | | 14th | Blow with a blunt instrument. | Near the coronal suture. |
| 32 | do. | 15 | 11 | Wound with a sharp do. | On the sinciput. |
| 33 | Female | 50 | 14 | Do. with blunt do. | Over the left eyebrow. |
| 34 | do. | 30 | 20 | Struck with many stones | Upon the head. |
| 35 | Male | 35 | 5 | Do. with blunt instrument. | Right side of the sinciput. |
| 37 | Female | 50 | 1 | Fall from a ladder. | Wound above the left eye. |
| 38 | Male | 60 | 2 | Fall on the ground. | Left part of the head. |
| 39 | do. | 50 | 1 $\frac{1}{2}$ | Struck with a stone. | Middle of the left eyelid. |
| 42 | do. | 30 | 3 | Fell from a window in a fever. | Left side of the head. |
| 44 | do. | 20 | 14 | Struck by a sharp instrument. | Left temporal muscle cut. |
| 45 | do. | 22 | 13 | Do. do. | Do. do. do. |
| 49 | do. | 20 | 14 | Do. do. | Left part of the occiput. |
| 50 | do. | 30 | 1 | Fall from an elevation. | Left side of the head. |
| 51 | do. | 50 | 14 hours | Struck by a horse. | Hinder part of the head. |
| 53 | do. | | 25th day | Do. by cutting instrument. | Fore, hind and left part of d |
| 54 | do. | 40 | 7 | Do. with a bill. | Right side of sagittal suture |
| 2d Letter | | | | | |
| 2 | Female | 50 | 11 | Fall into a ditch. | Side of sinciput. |
| 3 | Male | | | Fall. | |
| 4 | Female | Young | 11 | Blow with an iron bolt. | |

| Symptoms. | Appearances. |
|---|--|
| 11th, Fever, rigor, vomiting. | Os frontis depressed, scale injured. Pus between dura and pia mater. |
| Vomiting. Depressed bone could not be elevated. | Dura mater inflamed. Serum between dura and pia mater. |
| Do. 10th. Fever, coldness. | Brain wounded by bone. Sanious. |
| Do. 10th. do. do. delirium, coma. | Fracture with depression. Dura mater wounded. Pus. |
| None at first. Paralysis. Coma. | Do. do. membranes and brain wounded. |
| Pale and senseless. | Many fractures. $\frac{3}{4}$ ij of coagulum. |
| Vomiting, do. convulsed. | Fracture and extravasation on both sides. |
| Convulsions till death. | Fractures. Dura mater pricked;—former fracture. |
| Left side paralytic, speechless. | Fissure on left side. $\frac{3}{4}$ ij of extravasated blood on right side between the dura and pia mater. |
| Speechless. Right side palsied. Sense remained. | Cut deeply into the brain. Serum. |
| Convulsions chiefly on right side. Do. | Do. do. do. |
| 12th day, fever, rigor, delirium. | Fissure. Pus adhering to the dura mater. |
| Vomiting, speechless, senseless, convulsed. | Do. $\frac{3}{4}$ ij of blood between cranium and dura mater. |
| Do. do. speechless. | Fracture to the base. Extravasation between dura and pia mater. |
| 16th day, speechless do. | Brain cut both before and behind. |
| Gradually palsied on the left side. | Brain and longitudinal sinus wounded: large extravasation. |
| Bone laid bare. No symptoms. | Bone, membranes and brain livid; serum. |
| | Do. do. |
| Symptoms of concussion. | Pus between bone and dura mater. Sphacelus. |

| No. | Sex. | Age. | Day of Death. | Nature of Accident. | What part injured. |
|-----|--------|-------|---------------|-------------------------------|-----------------------------------|
| 6 | Female | | | Wounds with sharp instrument. | Right temporal muscle. |
| 8 | Male | Old | 13th | Fall from an elevation. | Right side of the head. |
| 10 | do. | do. | 20 | Struck with a stone. | One side of the sinciput. |
| 11 | Female | | | Blow on the head. | |
| 15 | Male | Young | | Fall from an elevation. | On the sinciput. |
| 17 | Female | do. | 5 months | Blow on a marble slab. | Back of the head. |
| 19 | Male | 19 | few days | Do. with a pole. | Side of the Sinciput. |
| | do. | Old | | Do. do. | On the head. |
| 23 | do. | | | Fall. | Wound on the right side forehead. |
| 25 | Female | | 1 hour | Do. down stairs. | On the head. |
| 28 | do. | 18 | 8 days | Blow with a club. | Do. |
| 30 | Male | | 1 | Do. with a stick. | On the left temple. |
| 32 | do. | 39 | 4 | Fall. | On the forehead. |
| 34 | do. | | 4 hours | Do. from a high vine. | On the head. |
| 35 | do. | 24 | 4 hours | Do. do. | Do. |
| 38 | Female | | 6 years | Blow. | On the hinder part of the head. |

| Symptoms. | Appearances. |
|---|--|
| After some days, rigor, &c. | Dura mater red spots. Pus between the membranes. |
| 11th day, difficult breathing, stertor, &c. | Bone livid; dura mater ichor outside; false membranes, &c. within. |
| Fever; better; return. | A little pus on pia mater; other parts healthy. |
| None at first; afterwards fever and coma. | Bone healthy, pus under it, spicula. |
| Do. tumour, fever, 17th, trepanned. | None except a very little yellow jelly under the dura mater. |
| Scarcely any from March to August. | Not examined. |
| Vomiting, fever, coma. | Mucus above; great quantity of pus under dura mater. |
| Do. do. recovered. | |
| 17th. Fever and heavy sleep. | A little jelly under bone; immense coagulum in right ventricle. |
| Speechless, motionless, &c. | Fracture of basis; large extravasation; lateral sinuses ruptured. |
| Do. very slow pulse, afterwards quick. | Loose fragment behind the ear. Brain corrupted. |
| Drunk. | Between ζ ij and ζ iij of half coagulated blood between bone and dura mater. |
| Do. vomiting, torpid. | Os frontis fissured; grumous blood under it. |
| Vomiting and speechless. | Do. fluid blood under dura mater and in ventricles. |
| Soon speechless. | Sinciput fissured. ζ iij to ζ iv of coagulum on the dura mater. |
| No symptoms for some months. Tumour in three years. | Caries seven inches by six. Injury of diploe. |

The preceding cases amount to *fifty-four* in number; of these *forty* were males and *fourteen* females; the ages are between *thirteen* and *seventy*. These patients lived after the accident from *one hour* to *six years*; but the most common period was from *fourteen* to *twenty-one* days. Of these *fifty-four* cases, matter was found in *thirty*. Of these *thirty*, the pus was found between the dura mater and pia mater in *eighteen* cases; and between the bone and dura mater in *twelve* cases; but most of these last cases were complicated with internal extravasation, or other fatal injury. The remaining *twenty-four* cases, (out of the *fifty-four*,) were cases of fissures, fractures, or separation of sutures.

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FINIS.

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